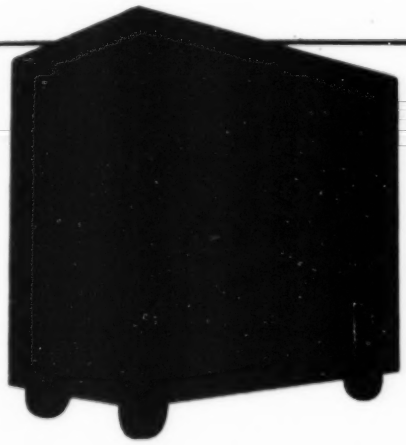
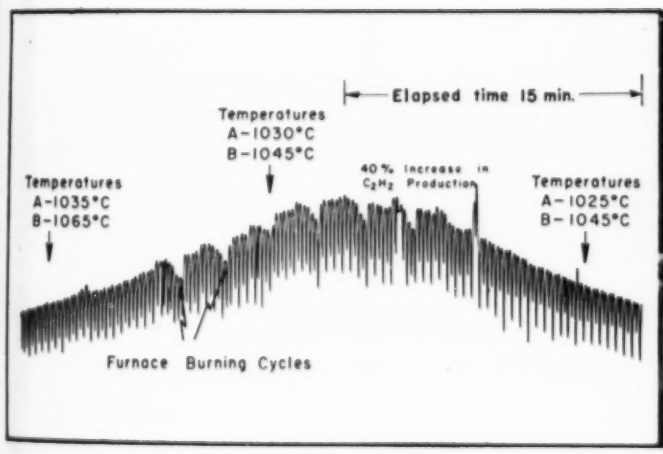
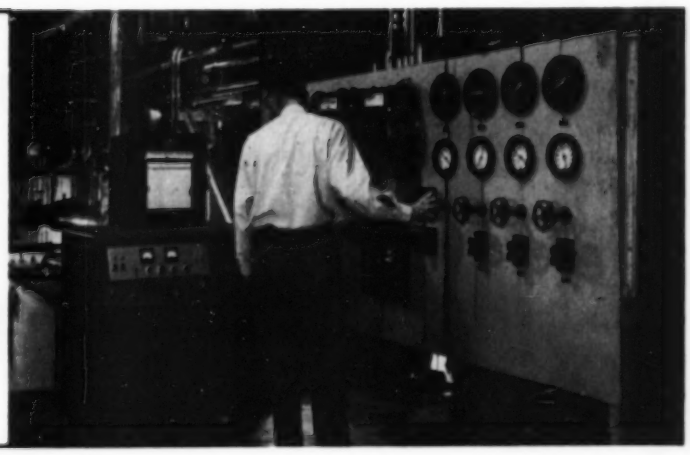
New acetylene production process uses the Consolidated continuous process–monitoring mass spectrometer..... for "on the spot" control

The new Consolidated Model 21-610 continuous process monitoring mass spectrometer played a part in the development of the Wulff Process for the commercial production of acetylene. Requiring only 110 volts and a small quantity of cooling water for operation, this self-contained, completely portable instrument was placed on stream in the pilot plant, where it monitored various gas streams under a variety of imposed conditions. Samples from 19 different points, introduced through a common manifold for analysis, made possible among other things: (1) the monitoring of feed stock, (2) evaluation of cracking gas composition versus temperature, (3) determination of fuel gas composition, (4) measurement of acetylene or ethylene content in recycle gas, (5) diacetylene scrubber efficiency, (6) acetylene or ethylene absorber efficiency, (7) solvent recovery and/or loss, (8) final product purity.



The chart, below, left, illustrates the versatility and practical value of the Model 21-610 as a production control instrument. The mass-26 peak of acetylene was monitored in the cracking gas coming directly from the unit as the furnace temperature was varied. From right to left, the temperature was slowly increased. The rise in the cyclically scanned 26 peak indicates rising acetylene content of feed stock. This test showed that acetylene increased approximately 40% with a temperature rise of 5 degrees C. Using the chart as a reference, guesswork was eliminated and maximum future production assured. Write for Bulletin CEC-1824-X22.





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GAS

30th Year of Publication

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BPA

Thermally Thinking

SPOT NEWS AND COMMENT ON GAS INDUSTRY AFFAIRS

Highlighting the News

Pacific Northwest, Canada still big news-makers

Despite FPC staff counsel's recommendation of a denial of both Westcoast and Pacific Northwest proposals, and the Hunt bill to ban exports and imports of gas, a certificate could conceivably be issued this month to one of the applicants in the battle to bring gas to the Northwest. Predictions are the Hunt bill will not pass this session; it's ticklish, as the State Department pointed out in an official statement of opposition. Trade agreements with both neighboring countries would be jeopardized. . . . Westcoast President George McMahon blamed the staff's recommendation on "misunderstandings" which will be cleared up, he believes, in oral arguments now started. BC Electric Co.'s president, Del Grauer, was quoted as saying that "no doubt Westcoast will submit answers . . . *and* we are hopeful they will be adequate."

Export permits for Trans-Canada, Montana

The Alberta government has authorized Trans-Canada to start exporting gas to the eastern provinces not later than Dec. 31, 1955. On June 15, hearings will open in Ottawa before the Federal Board of Transport Commissioners for final okay. The Toronto *Financial Post* says the board will have to be satisfied with something less than specifics on costs, markets, and rates, because Trans-Canada cannot get firm purchase contracts and financing until the board gives its approval. . . . Alberta also okayed Canadian-Montana Pipe Line Co.'s application for a permit to export 386 billion feet from Pakowki Lake field to the Montana Power Co. . . And FPC hearings have started on a proposal of Treasure State Pipe Line Co., Great Falls, Mont., to increase presently authorized exports to Canada by 40 MMcf per year. Alberta has balked at accepting previously authorized 80 million.

Arden is GAMA president-elect

Thomas T. Arden of Appliance Controls Div., Robertshaw - Fulton, was chosen by the manufacturers for the top post at their GAMA annual meeting in Chicago . . . Another principal item of business: the manufacturers went on record with a resolution strongly opposing the Hunt bill to ban gas imports and exports.

$5000 in electric goods seen in 1964 home

M. V. O'Brien, GE vice president, predicts the electrical equipment industry will do more business in the next 10 years than it has in the past 75. By 1964, today's average investment of $1300 in such equipment (his figures) will have grown to $5000, he says. That includes the heat pump. . . F. E. Bodine of Westinghouse predicts that 2 million kw—slightly more than 1% of today's national output—will be produced by atomic energy.

Air cooling is AGA research project

Better gas-driven air cooling is the aim of an important AGA research project now underway, staffer Lee Robey told the production conference. "Currently the research consists of critical surveys, one in the field of adsorption cooling aimed at improving or developing new and better adsorption type units, the second seeking a gas drive for a compressor or other gas driven means to develop cooling—jets or pulse pumps, for example. There is a great deal of interest within the gas and air conditioning industries in gas units. It is possible that new units will be available within the next three to five years."

An Eye on the Capital

Too early to bury Northwest gas plans; they're still alive

The longtime hassle over who will serve new areas of the Pacific Northwest area with natural gas, and whether from inside this country or from Canada, likely is to be settled by this fall, according to highest sources inside the Federal Power Commission here.

This is *not* to predict that the commission will overrule the recommendations of its legal staff that *all* the present applications for the right to serve the Pacific Northwest area be turned down, because the attorneys think that no company has made a proper showing that it can guarantee an adequate supply.

The high FPC source, without committing the commission one way or another in ruling on the present, more-or less consolidated case, pointed out that a revised plan could be introduced at any time, or that an entirely new application could come in case the FPC turned down the present contenders. This source said that it was his guess that residents of the areas to be served would know sooner or later who might serve them, and he hinted that it would be sooner rather than later. The FPC, of course, is *not* bound by the opinions of its legal staff, and the oral hearings may disclose new points that will outweigh factors that might have appeared important when the legal staff had the case under consideration.

A slow shakeup in FPC

The rumors are numerous at FPC about possibilities of major changes in organization, what with a now widely discussed management engineering survey made under the aegis of the Bureau of the Budget and having the express good wishes of the new Republican

Thermally Thinking

team in charge of the agency.

However, because of the fact that fear of joblessness was bothering many employees, Chairman Jerome Kuykendall has reassured the agency's staff that no precipitate changes are going to be made, and that shifts, transfers, and new lines of jurisdiction would be put into effect gradually, never with the idea of harming individuals.

The Civil Service Commission has been writing the job specifications for a new executive officer for FPC, who would serve directly under the chairman and would be answerable to him in all staff matters, particularly those relating to personnel, organization changes, etc. When this individual is named—and it is likely to be soon—he will have virtually sole responsibility, at least primarily to the employees, for all employment, personnel, and discharge matters at FPC. The chairman will be freed from such headaches to concentrate on higher policy matters, although, of course, as always, his will be the ultimate responsibility.

The changes resulting from the management engineering report *will* be significant, in the opinion of high FPC officials, but these changes will not be made abruptly and without regard to the human element. It is believed that, once the new executive officer is named, he will put the changes into effect and will bear the onus of any blame or reap the praise that may be forthcoming. The only trouble—in government—is that few taxpayers hear about the meritorious administrative changes, but they hear plenty when the slightest injustice is done to an individual, or there is the hint of politics in a change. That is why the changes at FPC are going to be made slowly—but surely!

No de-emphasis this year

Longtime Washington observers and reporters have noted that the "de-emphasis" on Washington, expected by some naive persons with the advent of the new Republican administration, hasn't materialized. If anything, there is more doing—of intrinsic interest to the natural gas industry—in Washington today than there was a year, or two years, or 10 years ago. This is due both to the enormous growth of the natural gas industry—with all the problems attendant upon such growth—and also to the steady, unremitting push of the pressures from many groups in the society which cause constant changes—from a regulatory standpoint, from a legislative standpoint, and from the standpoint of overall government.

In a session that already has seen the natural gas industry take top billing more than once—the Hinshaw bill's passage, for instance—natural gas is still very much in the news on Capitol Hill.

Some of the legislation in which the natural gas has abiding interest is as follows:

A bill—S. 3315—introduced by Sen. Russell Long (D.-La.) under which the federal government would guarantee municipal bonds issued to finance gas systems, water, sewage and other utilities. He was joined in sponsoring the bill by 11 Democrats and one Republican. The bill would help municipalities of less than 10,000 population in borrowing money from investors on long-term low-interest rates. This type of municipal borrower has been in trouble for some time, because of high interest rates.

The bill—S. 3178 — introduced by Sen. Homer Ferguson (R.-Mich.), which would require strict FPC adherence to original cost for rate-making purposes, will not be subject to hearings before mid-June, and it is felt strongly here that it will not get to second base before Congress adjourns. The impression is general—and likely is right—that Senator Ferguson introduced the legislation shortly before the FPC ruled in the Panhandle Eastern Pipe Line case (in which the commission substituted a "fair field price" basis for the usual original cost basis) for purely political reasons. He wanted to impress Michigan consumers with his advocacy of the consumer's interests. Senator Ferguson may declaim on the merits of his bill during the forthcoming hot political campaign in Michigan, but it won't go farther than that. Incidentally, he asked that scheduled hearings be deferred.

Another bill—S. 1278—introduced by Sen. Lester Hunt (D.-Wyo.), which would restrict importation or exportation of natural gas from Canada or Mexico, also is not likely to be passed this session, despite strong support from the United Mine Workers and other union groups.

Hearings on the Hunt bill brought out an amazing array of witnesses for and against it, and the press releases flowed copiously from both the coal-mining groups and the natural gas groups.

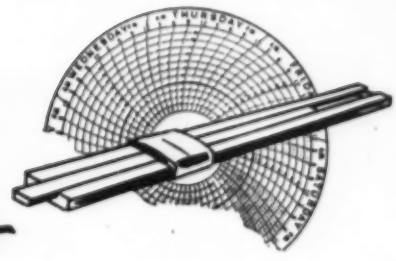
Scott Hughes, chairman of the legal committee of the Independent Natural Gas Association of America, with headquarters here, told the subcommittee of business and consumer interest of the Senate Committee on Interstate and Foreign Commerce that the Hunt bill, if enacted, would require the Federal Power Commission to act "in derogation of the public interest." Noting that the Natural Gas Act requires the FPC, in approving proposals to import or export gas, to act in "the public interest," Mr. Hughes declared that the present act makes the FPC able to protect the interests "of all parties concerned, including those of competing fuel interest, such as coal, who are parties by intervention in practically every case of any consequence heard before the commission." He added that the consumers' investment in gas-burning facilities in the U. S. probably is greater than the investment of the natural gas industry in its facilities "and it is imperative that every opportunity be provided to build up reserves to protect the consumers' investment."

On the other hand, Sen. Wallace F. Bennett (R.-Utah), formerly president of the National Association of Manufacturers, told the committee that if the bill "is not passed, there could be a virtual destruction of the coal mining industry in Utah and several other western states." He said he favored the Hunt bill for three reasons: (1) to prevent this destruction of the domestic coal mining industry; (2) to insure a coal supply for those consumers who cannot be served with gas, and (3) to maintain the national defense and security.

As if he did not have enough fights on his hand, what with the dwindling welfare fund and coal markets all over the place due to the high cost of the labor in his union, John L. Lewis (surprise!) came out in favor of the Hunt bill, too. This is one of the times that

Continued on page 62

Technical Trends



• By GUY CORFIELD

Gas jet compressor

A gas jet compressor is a device that uses the energy of high pressure gas to compress low pressure gas into a mixture of the two, which mixture has an intermediate pressure. It is analagous or similar to the perfume atomizer, paint spray gun, automobile carburetor or gas venturi-tube bunsen burner in that the velocity energy of a fluid stream is used to suck in and eject another fluid along with it.

Under any circumstance where gas is available at a pressure higher than necessary for use at its location, and would otherwise be reduced in pressure (as through a regulator) and its energy thereby partially lost, it is potentially useable for compressive work. It would probably not be economical to use pressure drop for compression purposes if the discharge gas would have to be recompressed as the jet compressor is not an efficient device, its overall efficiency being less than 20%. Also, if considerable pressure drop is taken, cooling will take place that may cause plugging by ice formation, and means of heating the nozzle by steam jacket or adding heat to the motive gas may be necessary and will of course entail some expense. However, jet compressors are inexpensive as compared to conventional reciprocating or centrifugal types, as they are more like a pipe fitting such as a valve or a flanged tee, and installation costs are low as no building or heavy foundation is required.

Gas jet compressors have been applied in a variety of ways such as to gather low pressure field gas into a higher pressure system, mix low pressure manufactured gas with high pressure natural to form a stream of mixed gas, and to compress gas leaking from the seals of a centrifugal compressor into the suction of the compressor.

Properly designed assemblies are commercially available. Performance can be approximately estimated in terms of pounds of motive gas per pound of suction gas vs pressure of motive gas, suction gas and discharge gas. For instance, if motive gas is at 1000 psia, it will require 2.5 lb of motive gas per pound of suction gas to take suction gas at 100 psia and discharge the mixture at 200 psia; or it will require 3.5 lb of motive gas per pound of suction gas to take suction gas at 200 psia and discharge the mixture at 400 psia; or it will require 6.5 lb of motive gas per pound of suction gas to take suction gas at 200 psia and discharge the mixture at 600 psia. If the motive gas and suction gas are at different densities, the above figures must be corrected by the ratios of the square root of the densities. Efficiency falls off rapidly as compression ratio goes up; best results are obtained if the compression ratio (discharge pressure to suction pressure) is 3 or less.

American Standards Association

A booklet entitled "The Library of Standards" has recently been prepared by the American Standards Association to describe this association's library at its headquarters in the Grand Central Terminal Building at 70 E. 45th St., New York. As stated in this booklet, the main purpose of this library is to furnish reference and consulting information on domestic and foreign standards. Another purpose is to correlate information covering the large number of standards producing agencies at home and abroad. It is available to all ASA member companies, trade associations, technical societies, and consumer organizations and those working on committees operating under ASA procedures, and its reference facilities are open to the public.

It contains more than 60,000 standards, specifications and related material plus a file of technical literature. The domestic files include, in addition to 1300 American Standards, most of those developed by national technical and trade organizations together with those from governmental agencies such as the Federal Specifications Board and the departments of the Army, Navy and Air Force. Data of government agencies also include commercial standards and simplified practice recommendations. ASA also exchanges standards with 40 nations many of which belong to an International Organization for Standardization. A limited translation service, and assistance in obtaining complete translations, is furnished for those interested in foreign publications.

This library is under the charge of Eugene Somoff, technical service engineer, and Miss Hertha Wiegman, librarian. Information is supplied to visitors, by telephone, by mail, by sale of copies of the standards and by sale of photostats. ASA members may borrow most of the standards on file, for reference, copying or photostating, except Joint Army-Navy standards, which cannot be removed from the office, and government standards which may not be photostated.

Obviously this library is a source of information on materials, construction methods, sizing and testing, the value of which cannot be overestimated. Incidentally, it may not be generally known by gas industry people that their appliance and accessory requirements, usually spoken of as AGA approval requirements, are actually American Standard approval requirements, by virtue of the AGA approval requirements committee (and its several subcommittees) being a sectional committee, Project Z-21, of ASA and therefore, in effect, being in the position of developing and sponsoring requirements that are adopted by ASA and gain prestige thereby.

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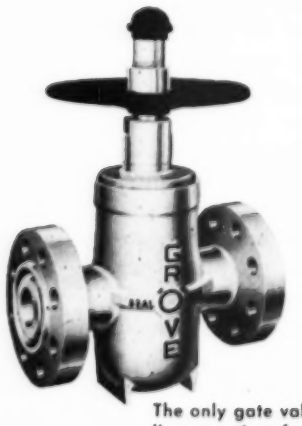

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A new approach to meter design

By **JAMES WEBB** • Consolidated Edison Co., New York

"There has been considerable discussion as to the merits and requirements of a so-called 'disposable meter.' It is the opinion of the subcommittee on meters and metering that this subject should be brought to the attention of the gas industry. There are two problems involved in bringing about economical metering for the future: One is a new approach to meter design and assembly, and the other is the standardization of specific ratings of sizes of meters to cover the ranges of loads to be metered."

GAS utility companies, like other industries, are faced more and more with the problem of the mounting costs of doing business. The particular element of these costs, which is our responsibility, is that of the purchase and maintenance of gas meters. To continue to maintain a high degree of performance and accuracy in gas meters, it is necessary to review the factors than influence the cost of metering and determine what steps can be taken in the future to reduce these costs.

Maintenance doubled

The cost of maintaining gas meters with the present day hourly wage rates and increasing overhead expenses, has doubled within the last several years. Labor costs already constitute a high percentage of the total cost to manufacture the present tinned steel case gas meter and, with a continually rising labor market, we cannot see any overall reduction in the future unless new production and assembly methods are adopted. Aside from the increasing labor costs, experienced labor for soldering operations is not readily available at all times. The character of this work does not attract new employees; therefore, it will not be long before the art of hand soldering will be lost to the industry. In addition, labor turnover always requires expensive training. To take care of changing operating conditions and to maintain our standards relative to accuracy and performance on low loads, and also the metering of pilot light loads, will all tend to increase our present cost of metering.

Excessive non-routine replacements, due to meters leaking, meters that do not register, also meters that do not pass gas, and noisy meters, all require immediate attention. These non-routine operations all have an effect in increased maintenance costs, and also require increased stock requirements, which reflect in additional storage and transportation costs. The additional visits to customers' premises that result always cause annoyance to the customers.

With this introduction, the metering problem must be re-examined on the basis of minimizing the company costs required to supply gas service. As previously mentioned, present repair practices and meter design promote increased future costs. Therefore, a new approach must be established that will provide both lower initial costs and lower operating costs. This cannot be accomplished unless a standard meter design is adopted which will eliminate the need for special features.

The present tinned steel case meter, with all its parts, and there are many, does not lend itself to production line manufacture. This meter is completely hand-assembled, with the exception of a few parts.

When we say "hand-assembled," that is exactly what is meant when parts are put together entirely with solder and hand soldering copper. For a moment, let us visualize these separate parts and the number of people required to handle them before and during the assembly of a gas meter. First, the parts are fabricated, then stored, and distributed to numerous work locations. At these work locations, one or two parts are assembled by an operator and passed on to another who adds a part or two and so on until the meter is finally assembled. All of these operations are by hand, which means a terrific handling and moving problem to and from the numerous work locations. This type of assembly also requires very large work areas. Where a number of parts are assembled, numerous tests are required throughout the assembly. By elimination or simplification of some parts and making a combination of others, the assembly operations could be simplified.

Standardization

I am not one to promote standardization merely to have everything the same. Standardization can be harmful if it is unduly restrictive. Generally speaking, standardization can be brought about by "give and take" of the parties concerned to meet specific problems. With more and more meters

on natural gas, our future problems, if any (I say this reservedly), should be on a common ground.

Not a standard meter

The present day meter is not one that can be called a standard meter. The gas utility companies themselves are somewhat to blame for this condition. Fundamentally, the basic principle of all sizes of domestic meters used today is the same but we, of different utilities, ask for this or that modification and sometimes special additions to a meter. True, they may seem of a minor nature, but nevertheless a meter manufacturer cannot carry an inventory of any size, because he never knows what his next meter order will call for. For instance, meters can be purchased with or without reverse stops, adjustable or non-adjustable tangents, three or four circle indexes, putty seal or solder seal index boxes and many other combinations. This diversity prevents a meter manufacturer from making a standard meter which he could ship direct from stock. If a standard meter is adopted, it would be possible to ship the meters direct from stock, and the manufacturer's inventory could be built up during off-peak times, which should result in a reduction in the cost of a new meter.

We are purchasing a meter today that does not economically lend itself to present-day experience. With the use of natural gas and the increased use of synthetic diaphragms, it will seldom be necessary to remove the fronts and backs of meters. Why, then, should we pay for having these parts readily removable when we know we will rarely be required to remove them during the life of the meter. Another example: why have a separate enclosure for valves when it could be dispensed with. There are many other details of meter design equally questionable, but I just desire to point out that we now are buying many special features for which there will not be a future use. These and other kinds of savings and changes are necessary to produce a meter that will result in economical metering for domestic gas loads.

The design of this meter should be one that is readily adapted to machine production - line methods, whereby a simplified design, and perhaps newer materials, could be utilized, with the following features in mind:

Material should be strong enough to to reduce case damage in handling and decrease weight.

Simplified inlet and outlet connections to decrease costs.

Design which will lend itself to compact shipping on pallets.

Wherever possible, parts should be combined, such as entire fronts and backs of meters could be made of one piece; likewise, both sides and bottom could be made as a unit. This type of assembly will decrease the number of seams required; therefore, decreasing the potential for leaks. Seams could be of a welded or pressed design, which could be readily adapted to machine operation rather than hand assembly.

Provide a simple means of adjustment for accuracy which will contribute to rapid adjustment of meter.

Elimination of frictional changes in meter, as related to bearings, packings, valves, etc.

Simplification of parts to reduce load requirements for installation. This is very important in large group or bank installations and also for storage and transportation.

Suggested considerations for meter design

1. ***Seams made by machine methods***
2. ***Simple arrangement for accuracy adjustment***
3. ***Strong, lightweight materials***
4. ***Unitized components***
5. ***Design for palletized shipping***
6. ***Simplified inlet and outlet connections***
7. ***Simplification of parts***
8. ***Reduction in space requirements***

Advantageous results

If a meter of this design can be brought about, it will result in lower investment and operating costs.

Much has been said about a "throw-away" or "disposable" meter. I want to say now that every meter, and every other piece of equipment, comes under this heading sooner or later. Today, whenever it is cheaper to dispose of a meter than to repair it, we do just that. To talk about designing a meter as a "disposable" meter is a play on words.

The basic question is related to the design of the meter. If it has to be designed for easy access to each and every part at any time, that's one design problem and is usually an expensive one to work out. If the designer can be left free to produce a meter (in the most economical manner) without the necessity of providing easy access, but rather putting emphasis on providing a sturdy, rugged mechanism to meet our requirements for accuracy, performance and economy (since that is a different problem), it almost goes without saying that you will not be able to get inside for repair as readily. The whole question then becomes one of economics. For instance, if a coil becomes defective on your automobile, it is not repaired but is replaced with a new coil. The automotive industry discovered long ago that for many pieces of equipment it was better to devote attention to improve manufacturing techniques rather than to make devices accessible for repair. Because of this, it has become more economical to replace rather than repair. Some of the items to be considered in designing a meter along these lines are as follows:

Such a meter might have seams made by machine methods. This will minimize the possibility of leaks and will provide more economical fabrication than present methods.

Access unnecessary

With the expanding use of natural gas, it is not necessary to have access to meter diaphragms or valves. Therefore, a meter could be assembled with permanent seams. This will eliminate many hand operations which should bring the cost of the meter to a point where it would be economically possible to dispense with it if for any reason diaphragms became defective or for any other internal fault.

A simple arrangement could be designed for accuracy adjustments of the meter which would make it possible to re-use the meter for as many cycles or periods as it continued to operate satisfactorily. If the meter became defective or it could not be adjusted to meet requirements, it would then be dispensed with. The cost of condemning a meter in this manner could, therefore, be balanced against the overall savings in

using meters of this design. A meter of this design can bring about a new retirement policy based on the production of an economical meter.

Meters today are made in a large number of ratings. It would be important in connection with any new approach to meter design and assembly to decide on fewer specific ratings to cover the ranges of load to be metered.

Smallest suitable meter

As a first step in this process, it would be well to decide on the smallest capacity of meter which can be utilized to cover a large field of application. Such a meter should be high enough in capacity to cover a large percentage of domestic customers and yet low enough in capacity to take advantage of small valve construction to insure the best possibe pilot load registration.

The large majority of gas meters in service today are supplying domestic customers, which is the group where a high percentage of the metering costs is expended. The first thought that comes to mind is, "what size and type of domestic loads are we required to measure today and with what size meter"? Let us look at the facts.

The first class of domestic customers is made up of tenants in multi-family dwellings where central heating and domestic hot water are provided by the landlord. In households of this character, the gas range is essentially the only utilization of gas.

Then there is the domestic customer in the single-family home with house heating and domestic hot water provided by some other means with the range as the only gas utilization. The same general capacity of meter is applicable here unless a gas company desires to size a meter for possible future installation of house heating and domestic hot water. This is a matter for individual company decision.

The next class is the one-family residence with gas house heating and domestic hot water. After this, we have the larger type residence and the same reasoning as to proper sizing of meters should apply to these loads and likewise to larger gas loads to minimize the number of meter sizes required to be manufactured.

For a more detailed analysis of the customers where the range is the only utilization of gas, it will be necessary to look at the facts more closely.

There has been a considerable change in our mode of living in the past decade. This is especially true in the large metropolitan areas where there is a density of apartment dwellers. We are all aware of the number of families where both the husband and the wife go to business. This has the effect of largely reducing gas consumption.

The days of the housewife preparing large meals is very rare today, especially if she goes to business. Another contributing factor to the low consumption of gas is the increased use of frozen and partially prepared foods, which are now produced in all items of food and have a widely developed market today. These foods require a much shorter cooking time, and the pressure cooker has further decreased the time necessary to prepare foods. Another item which has a very large bearing on gas consumption is the housewife's knowledge of vitamins and minerals to be saved by proper cooking. To attain this goal, less water is used to cook foods—therefore, less heat is required. In other words, the housewife is using measured heat, so to speak, and the modern gas range supplies this requirement. The modern range has a full flame for quick boiling, intermediate heat, simmer heat, and a very low flame for keeping foods warm. A recent survey disclosed that 80% of the cooking today is accomplished on the top burners of the range. Plug-in appliances, such as coffee percolators and broilers, have an effect on gas consumption.

Average maximum

The average maximum 30-minute demand for range utilization only during months of peak usage probably does not exceed 30 cu ft per hour of 537 Btu gas or 15 cu ft per hour for natural gas.

At the present time, meters of 150 cu ft per hour capacity are used to measure these small loads. It is similar to using a 55-gal. metal drum to store 5 gal. of paint. The drum requires more storage space, costs more, and the last drop never can be drained, which is not efficient. Consequently, more capital is expended for equipment. The storage and handling of the drum is a great deal more expensive than the use of a 5-gal. can.

More and more capacity

The trend has been to look for more and more capacity in a 5B domestic meter. This is very satisfactory, provided these meters can be used on loads close to the rated capacity of these meters. To use the 150-cu ft per hour meter to measure small gas customer loads which we are required to measure is not economical metering.

Before the introduction of natural gas, this was somewhat of a problem, but today, with natural gas expanding, it is of the utmost importance that we take stock of where we are going with customer loads of this character.

Considering the various classes of loads to be metered, I suggest that perhaps we have need for a meter of about 50-70-cu ft per hour rating for the domestic customer with a range only or a range and hot water heater. For the average customer with range, hot water heater and house heating units, a meter of 200 cu ft per hour would be desirable. Two such meter ratings would cover more than 90% of today's and future meter applications.

I have not gone into the complete details of design or economics of a smaller meter or a meter of new design. The sole purpose of this report is to plant a seed for thought and to start us thinking more about economical metering for the future.

Basically, what we require is a meter of new design which will be smaller, sturdy, dependable and economical. In addition, standardization of sizes should be considered which will decrease the number of ratings and should have a bearing on the physical size and weight of meters required to be manufactured.

"Much has been said about a 'throw-away' or 'disposable' meter. I want to say now that every meter, and every other piece of equipment, comes under this heading sooner or later. Today, whenever it is cheaper to dispose of a meter than to repair it, we do just that. To talk about designing a meter as a 'disposable' meter is a play on words."

This article has been adapted from a talk presented at the AGA distribution conference, April 20-23 in Montreal.

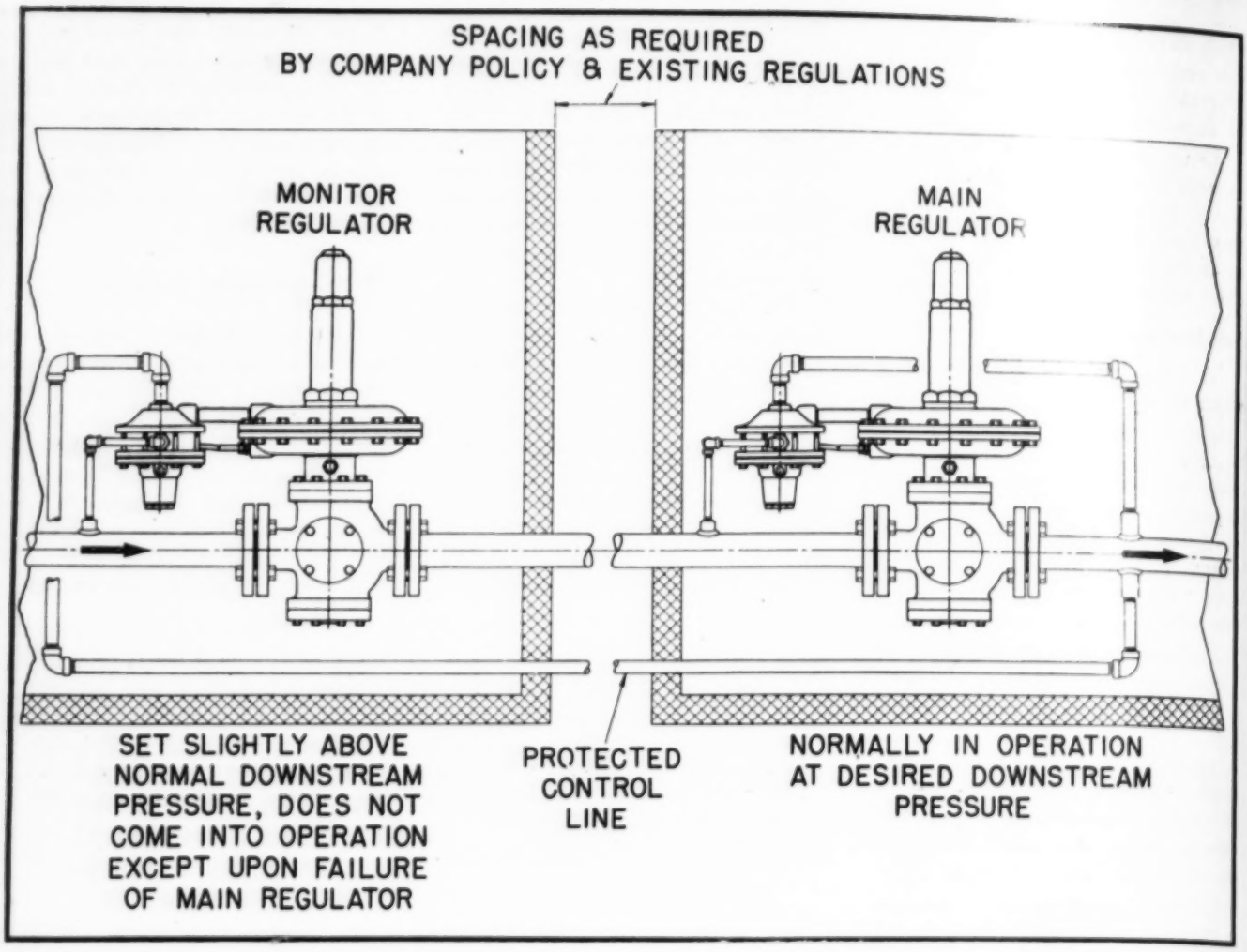


Fig. 1. An over-ride system of emergency pressure control.

GAS exclusive

Over-ride protection of distribution system pressure

By K. R. D. WOLFE, Vice President • Fisher Governor Co., Marshalltown, Iowa

AS THE gas industry continues its tremendous expansion program, it becomes increasingly important that safety keep pace with progress in other phases. As increasingly higher pressures have been introduced into systems designed originally for low pressure distribution, and as these higher pressures have been imposed on regulators and other equipment installed for a less rigorous set of operating conditions, the possibility of accidental excess pressure in low pressure distribution systems becomes more acute. Within recent years there have been certain unfortunate accidents of great severity involving accidental excess pressures that could have been avoided entirely through the use of equipment and techniques now well understood.

Regardless of what inspires a program to prevent excess pressures in a gas distribution system, there is only one way to approach the problem. That way is with a determination to make a complete analysis of all the factors involved and to assess the risk inherent in every possible situation. There is no room for a superficial approach or "whitewash" solution. No remedy should be attempted until the analysis is complete and a deliberate decision has beeen made as to the percentage of the hazard to be assumed as a calculated risk and the percentage to be eliminated by a safety program.

Let it be assumed that both the analysis and the decision have been made. Let it also be assumed that operating practices and maintenance have been oriented in a manner to forward the cause of safety. There still remain the matters of selecting new safety equipment and determining the manner in which this equipment is to be installed to round out the safety program.

As was pointed out in a previous article of mine entitled "Safety Relief

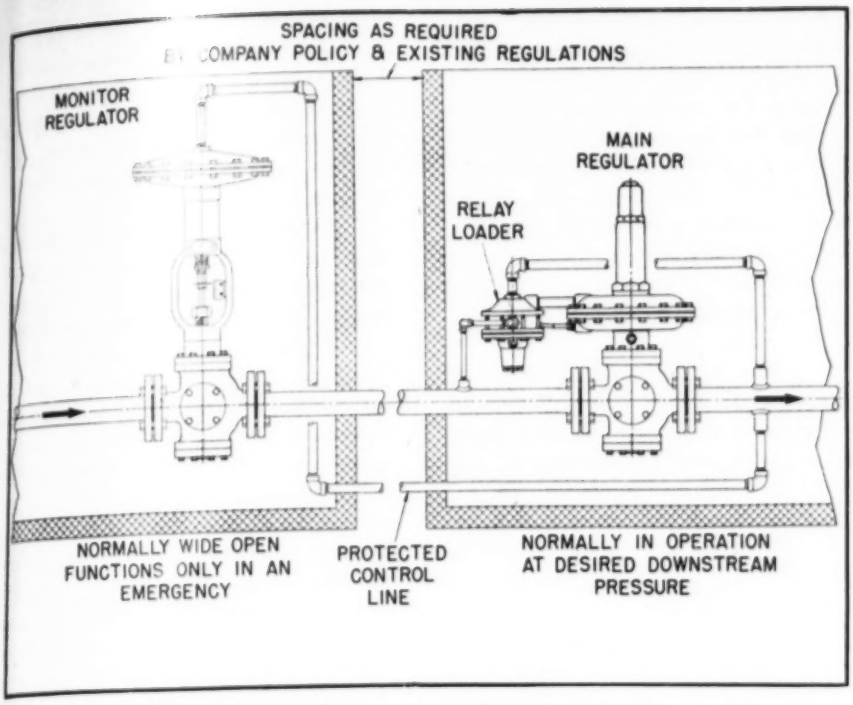

SPACING AS REQUIRED
BY COMPANY POLICY & EXISTING REGULATIONS
MONITOR REGULATOR
MAIN REGULATOR
RELAY LOADER
NORMALLY WIDE OPEN FUNCTIONS ONLY IN AN EMERGENCY
PROTECTED CONTROL LINE
NORMALLY IN OPERATION AT DESIRED DOWNSTREAM PRESSURE

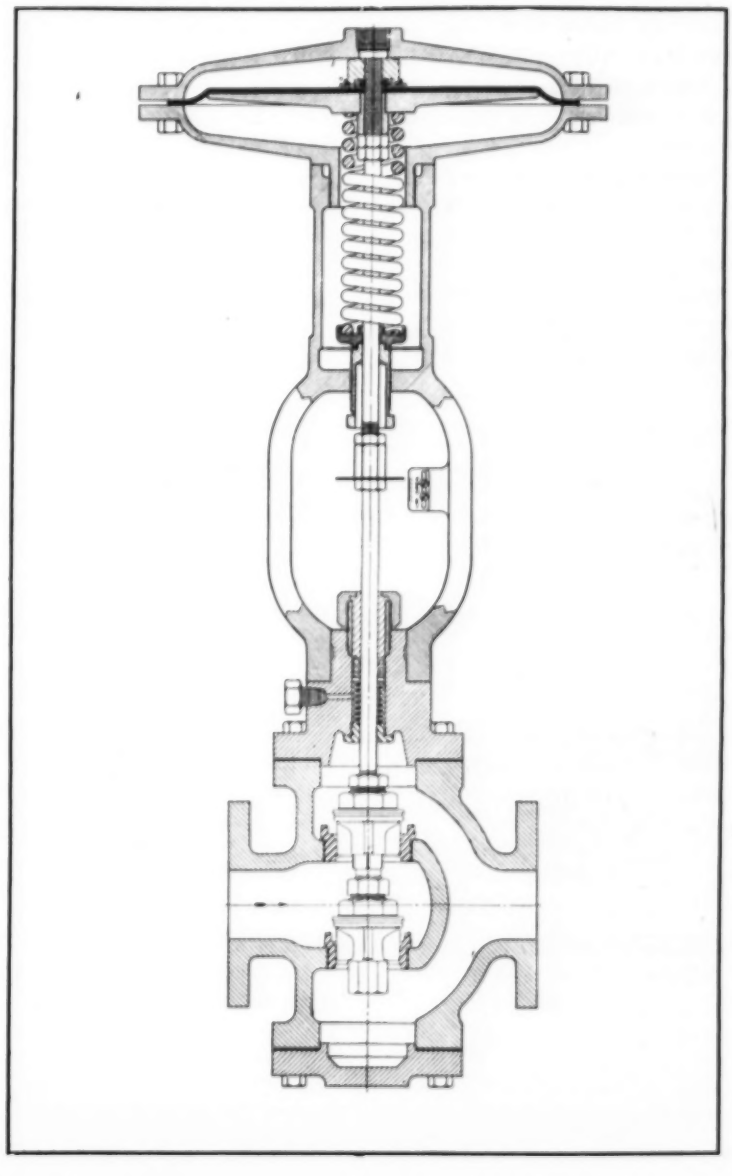
Fig. 2. The use of a self-operated regulator for pressure over-ride.

operation, and maintenance. Obviously, the operation of the auxiliary equipment for pressure over-ride must be integrated with and must not disturb the function of existing pressure regulators.

Before presenting and discussing several different types of over-ride systems, it would be well to point out that it is extremely important to design a system that is adequate but that does not place any heavier burden on the street department budget than is absolutely necessary. It is possible, by improper selection of equipment and improper location of equipment, to run the cost out of sight.

At the same time, there is an absolute minimum cost to an over-ride system and this minimum is, to a large extent, determined by the amount of pressure drop available for regulator

Fig. 3. Diaphragm motor valve employed as self-operated monitor.



and Shut-Off Valves for Distribution Systems,"* there are three schools of thought within the industry as to the best method of protecting a low pressure system from excessive pressure in case of a district regulator failure.

One school believes in relief valves to open and vent any excess gas in case of district regulator failure. The second school takes the position that it is preferable to shut the flow of gas off completely. The third group relies on auxiliary regulator equipment to "ride herd" on the pressure if the primary everyday regulator is caused to fail in the wide open position.

It is with the third school of thought that this article deals. The equipment installed may be called "over-ride" or "monitor" equipment, but in either event it constitutes a system in which an auxiliary regulator assumes pressure control at a level slightly above normal in case the main regulator fails in the open position. Object: SAFETY.

The design of over-ride systems such as the one shown in *Fig. 1*, entitled "An Over-ride System of Emergency Pressure Control," demands most or all of the regulator know-how of simple pressure regulation. It also introduces some new considerations that must be taken into account. This means that over-ride regulation should not be undertaken except for personnel well grounded in district regulator design,

*Issue of GAS, October, 1952.

operation. Simply stated, there must be a greater pressure at the inlet to a regulator than there is at the outlet. Otherwise, there would be no flow. If the primary regulator already installed is under-sized, then every bit of the difference between the high pressure available at the inlet and the low pressure desired at the outlet is needed to push the maximum gas demand through the regulator. When this is the case, it is obvious that an auxiliary over-ride regulator installed in series with the existing regulator must be extremely large in order to rob as little as possible of the available pressure differential.

For example, a 2-in. single-seated regulator may be serving as the district governor. The inlet pressure at the time of greatest gas consumption for the district is 17 lb. The downstream pressure desired is 8-in. water column and the greatest load experienced is 26 Mcf per hour. A check of the regulator capacity indicates that all it can supply even when wide open with a 17-lb inlet is 26 Mcf per hour. There just isn't any pressure differential left that can be assigned to a new auxiliary over-ride regulator in series.

The remedy is to increase the inlet pressure if such be practical. Many times this is not practical and it becomes necessary to install a regulator of greater capacity so that it will flow the full required load of 26,000 ft per hour on less than the available 17-lb inlet pressure.

We could, for example, install a 2-in. double-ported rather than a single-seated regulator at this location. In checking the capacity of such a unit, we find that it will flow 26,000 ft an hour even though the inlet pressure falls to 3 lb. This means that we can install in series an over-ride regulator that when wide open will flow the required amount of gas with a drop equal to the difference between 17 and 3 lb. This is 14 lb. Referring again to our sizing chart, we find that this would be a 1¼-in. double-ported regulator of full modern design. While the foregoing example does not take into account all of the determining factors by any means, it does demonstrate the important part played by pressure differential available and the size of the existing regulator equipment.

At the risk of laboring this point, a similar analysis should be made based on leaving the single-ported 2-in. regulator in the line and installing a large enough over-ride regulator upstream to absorb not more than ½ lb of the much needed pressure differential available. This sizes out to be about a 4-in. regulator. This gives an awkward combination of a 2-in. single-seated unit and a 4-in. double-ported auxiliary. This is even more out of proportion than the previous 2-in. primary regulator and 1¼-in. auxiliary.

Perhaps the best arrangement would be to take out the 2-in. single-seated unit and then install 1½-in. double-ported units for both primary and auxiliary regulators. Not only are they of a common size, which may be an advantage, but the two in series will flow considerably more than 26 Mcf/hr with 17 lb total pressure drop across the combination. The possibility of load increase is always present.

There are other considerations that should be kept in mind, since they affect not only the mode of operation but also the cost of the equipment and its installation. One such factor is the "accuracy" of pressure control that is necessary or desired during the period when the primary regulator is out of control and the "monitor" over-ride is called upon to assume control. It is an accepted fact that the primary regulator should control right on the money and should not allow the downstream pressure to vary more than a fraction of an inch regardless of the rate of flow, since it does the job every hour and every day. On the other hand, the same high standard of performance would not be required for the brief period when the over-ride unit called upon. Basically all that is necessary is to keep the downstream pressures within the minimum and maximum limits that would be tolerated by the appliances. If the primary regulator controlled at 7-in. water column day in and day out, there would be nothing more serious than a slight rash of service calls if the auxiliary were to take over and control between 9-in. and 12-in. water column. The chances are that the full extremes would never be experienced since the lowest pressure corresponds to wide open flow and the highest pressure corresponds to complete shut-off. The trouble which caused the primary regulator to fail would have been detected and corrected before the service department received more than a ripple of extra activity.

Fig. 2 shows an over-ride system wherein a certain amount of downstream pressure variation, during the emergency period which might occur, is regarded as acceptable. Note that the main or primary regulator is of the modern relay loaded type which can stroke its valve as much as 2 in. with a corresponding high capacity and very small variation in downstream pressure. In the absence of an emergency, the relay-operated main regulator sends out the same pressure regardless of whether it is during the noon cooking peak or the small wee hours of the morning with no gas load.

On the other hand, the monitor reg-

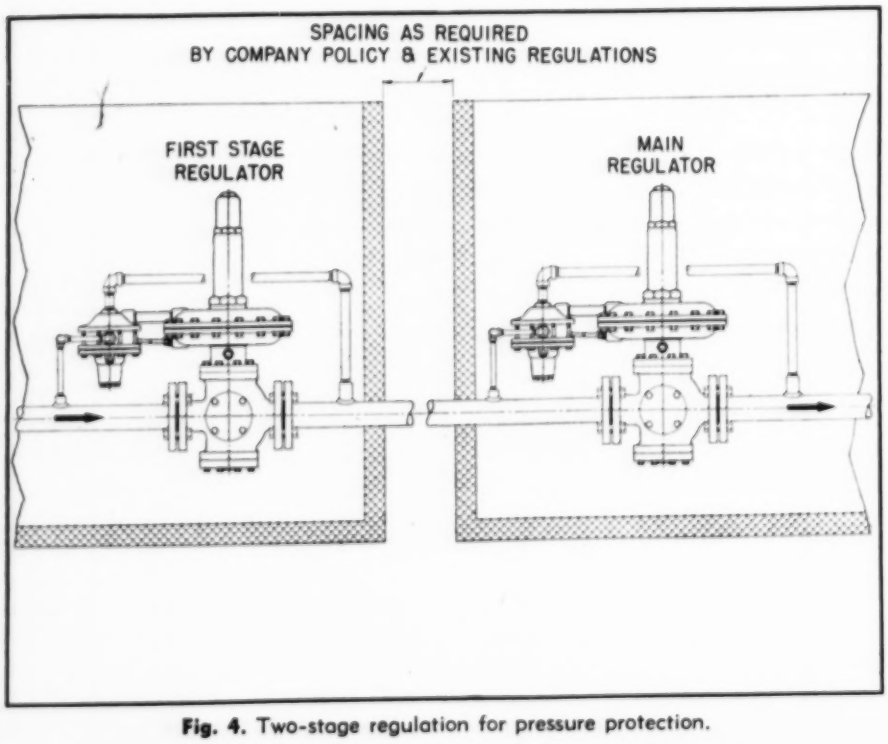


Fig. 4. Two-stage regulation for pressure protection.

lator is a simple, self-operated regulator which is relatively inexpensive but which does a rough-cut job of pressure control. The construction of this diaphragm motor valve employed as a self-operated monitor regulator is shown in *Fig. 3.* The construction is such that the spring holds the inner valve wide open until the downstream pressure brought in on top of the diaphragm begins to overcome the spring force. Then the valve *starts* to close. By choosing the proper spring and diaphragm size, the monitor will start to close and control the flow of gas when the pressure communicated through the long control line in *Fig. 2* exceeds 9 in. (an inch or so above the normal distribution pressure). Naturally, this 9-in. pressure is not reached unless the main regulator is caused to fail and let excess pressure through.

If the gas load at the time is substantial, the monitor will not have to close very far in doing its over-ride job. The downstream pressure will not go much over 9-in. water column.

The main regulator failure might come at a time of low load. In such a case, the monitor would have to stroke from its wide open position down to a valve position close to its seat. This stroke compresses the spring and demands a corresponding increase in the pressure on top of the diaphragm. Therefore, under low load conditions, the self-operated monitor may allow the downstream pressure to go almost up to 1 lb. The pressure will be controlled, however, and the interests of safety will have been served. The performance described will be recognized as typical of self-operated regulators; it is the effect of wide proportional band.

Just off-hand, it would appear that this type of over-ride would predominate in the safety programs. It is simple and relatively inexpensive. For reasons best known to the operating companies involved, most over-ride systems have been installed in such a manner that the monitor regulator does just as good a job of pressure control as the main regulator. The pressure at which the monitor controls is slightly higher than that at which the main regulator controls, but the "accuracy" of control is equal. Such an arrangement is shown in *Fig. 1,* where two relay-operated regulators comprise the system.

In both *Figs. 1* and *2,* the monitor regulator is located upstream of the main or primary regulator. The control line for the monitor regulator is run to a point downstream of the main regulator. This would seem to be fundamental, and yet it is possible that conditions might dictate the system shown in *Fig. 4,* entitled "Two-Stage Regulation for Pressure Protection."

In this system, the true "over-ride" principle is not involved. This is purely and simply a two-stage system. Here is an example of the manner in which one gas company employs this system: The main regulator is installed with an inlet pressure of 5 lb. If it fails open, the full 5 lb rushes into the district affected. This gas company is of the opinion that 5 lb would be genuinely hazardous, but that 1 lb would only constitute a nuisance. In checking the capacity of the existing main valve, the company's operator finds that it is large enough to pass the entire load safely with only 1-lb inlet. The company has found out that under such circumstances, the first-stage regulator can be purchased and installed as shown in *Fig. 4,* the only requirement being that it have sufficient capacity to handle as large a load when reducing down from 5 lb to 1 lb. Note that no long control line is required. Long control lines demand extra attention to prevent accidental breakage. It is, of course, fundamental that *any regulator will fly wide open if its control line is broken.* It is possible to add an auxiliary pilot to the regulator which will cause it to go shut rather than open in case of control line breakage. It is a simple arrangement, and where such a device is of advantage from a safety standpoint, it should be employed.

Another variation of interest is the one that calls for the monitor regulator to be installed downstream of the main regulator. One approach to this would be to select a large enough monitor regulator that it would stand wide open in the line downstream of the main regulator and not cause enough pressure drop to be objectionable. This is an expensive approach, since, for example, it takes an extremely large regulator to pass any substantial amount of gas even when wide open if the pressure drop is not to exceed 1 or 2 in. of water column. Some operators prefer the different approach shown in *Fig. 5* entitled "Over-ride System with Monitor Downstream."

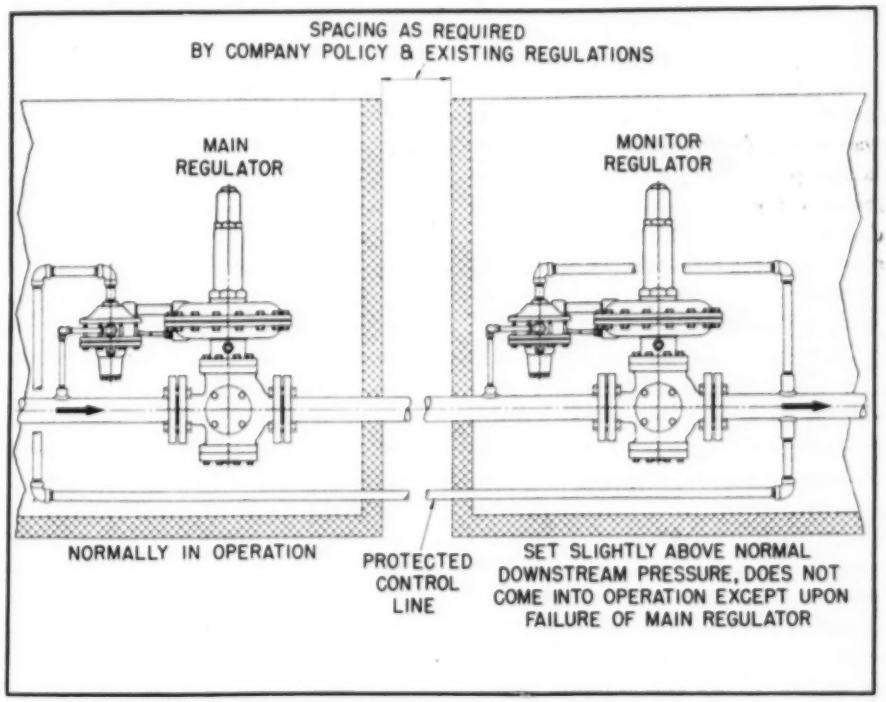


Fig. 5. Over-ride system with monitor downstream.

At first glance, the diagram in *Fig. 5* appears identical with that in *Fig. 1.* It is different only in the "modus operandi." In this case the operator has located the auxiliary monitor regulator downstream as dictated perhaps by the lack of pit space upstream. For reasons which are considered sufficient, he wishes to have normal pressure control exercised in the existing pit. All that needs to be done to accomplish this is to set the relay loader on the upstream regulator at the desired downstream pressure and set the relay loader on the downstream regulator at a slightly

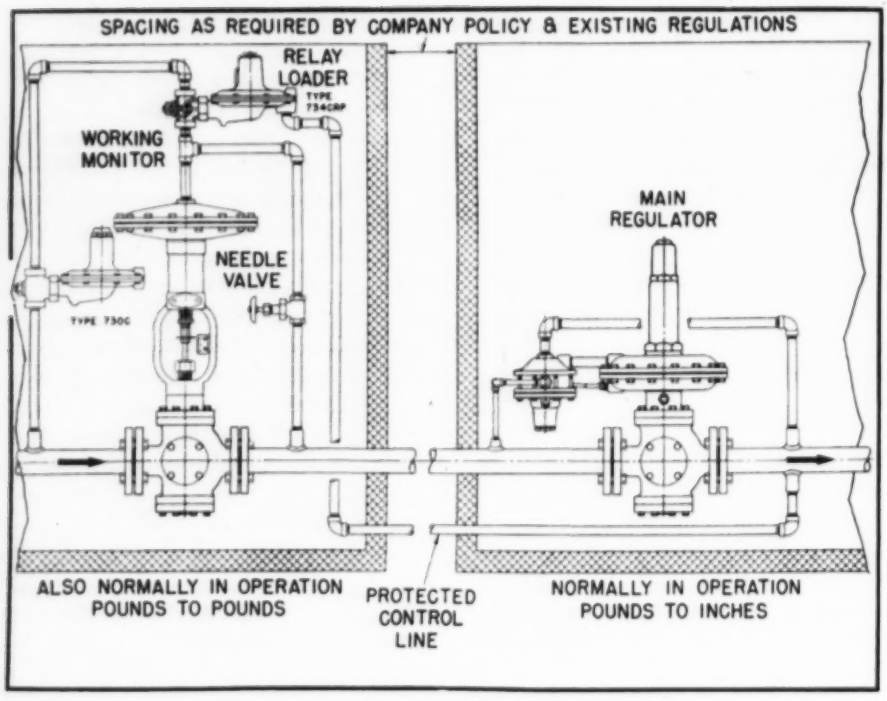


Fig. 6. Over-ride system with working monitor.

higher level (this is opposite to the way it was done in *Fig. 1*). As long as the pressure downstream of the monitor regulator stays at the desired distribution level, the monitor will remain in the wide open position. The higher pressure setting of its relay loader dictates this situation.

The main regulator, however, will be controlling and will deliver a pressure at its own outlet which is equal to the desired distribution pressure plus whatever pressure drop occurs across the wide open valve of the monitor regulator. The pressure drop across the monitor regulator in the wide open position is a function of the rate of gas demand in the district. This means that, with the over-ride system shown in *Fig. 5*, the main regulator delivers a pressure at its own outlet which varies with the district gas demand while at the same time the result is to deliver a constant pressure to the district below the monitor. The level of the pressure between the main regulator and the monitor regulator is determined by the amount of the total pressure differential available allocated to each of the two regulators as outlined earlier in this article.

It follows, of course, that if the main regulator is caused to fail in the wide open position, full upstream pressure will attempt to rush into the district. A rise in pressure in the district of 1 or 2 in. calls the monitor regulator into control and it starts riding herd on the pressure.

There are other considerations, some of which apply at one property and not at another. This points up the need for a careful survey, not only of each operating property, but also of each district regulator station within that property. One such consideration is that of having a safety device stand in a non-operating condition until an emergency occurs. The over-ride system shown in *Figs. 1, 2,* and *5* are so arranged that the monitor regulator stands idle in the wide open position unless something goes wrong with the main regulator. In *Fig. 4*, both regulators are "working," but this is not a true over-ride. The objection to an idle monitor can be overcome by a periodic testing and inspection program.

Under certain circumstances, however, it is considered highly desirable to have a working monitor. This can be accomplished in a number of ways. For example, the system shown in *Fig. 1* can be modified to provide this feature. A second relay loader is mounted on the monitor regulator, and this relay loader is connected in to cause the monitor to operate at some intermediate pressure. This intermediate pressure exists during normal operations between the monitor and the main regulator. If the main regulator goes improperly to the wide open position and the district pressure tries to rise above the setting of the first relay loader on the monitor, this first relay steals control away from the second relay and the monitor delivers inches of water column to the district rather than pounds to the main regulator. This is a refinement of the over-ride system in which one relay over-rides the other on the monitor and the monitor over-rides the main regulator.

This same feature of working monitor is shown in a less involved way in *Fig. 6* entitled "Over-ride System with Working Monitor." By comparison with *Fig. 2*, a close similarity will be found. A relay loader has been added, however, and some of the details of operation altered so that a brief explanation may be in order.

In *Fig. 6*, the main regulator is operating to reduce pounds to inches and is doing the primary job of seeing that the district is supplied with gas at the proper pressure. The monitor in this case is not just standing by until an emergency. It has a control line connected from its diaphragm casing through a needle valve to the piping between the pits. With this arrangement, the monitor will function as a self-operated regulator at a pressure which is determined by the spring in the monitor and the diaphragm size in the monitor. These can be selected so that the monitor will "rough cut" the upstream pressure from 25 lb to 10 lb.

Also connected into the diaphragm casing of the monitor is a relay loader which has its control line run downstream of the main regulator. This relay loader is so set that it remains closed until such time as the main regulator may lose control and allow excess pressure into the district. Should this happen, the relay loader opens up at approximately 10-in. water column (or slightly higher than normal distribution pressure) and allows upstream pressure to be imposed on the monitor diaphragm. This over-rides the pounds-to-pounds control system and the monitor assumes pressure control of the district.

As might be expected, there are a number of variants of all the systems described. They appear complicated at first glance, but over-ride systems actually offer enough flexibility that they can be designed to fit exactly the requirements of each property and implement a well thought out safety program. There is no "package" over-ride system. Sound gas engineering is demanded in every individual case if safety is to be achieved.

Action is the word!

Reports from seven "test cities" substantiate the need for intensive action in the Gas Industry Development Program.

Christy Payne Jr.

THESE are trying times in the gas business.

Evidences are all around us. The most frightening is the fast-closing gap between gas and electric range sales, where the ratio of shipments in the first months of 1954 dipped to a horrifying 1.2 to 1 from an almost-infinity-to-1 proportion which existed less than a quarter of a century ago.

The gas range, and to a lesser extent other household appliances, are headed for the same destiny as gas lighting, if figures don't lie. In a desperate mass move to head off the trend, the industry this spring is looking toward the Gas Industry Development Program as its saviour.

At this moment, GID is not saving anything. It's mainly finding facts, many of which have been long known or at least suspected. It's conducting surveys that are in a large measure substantiating the findings of previous surveys. But they have a function: in relating the findings directly to a number of scattered locations, they are substituting the concrete for the abstract. At the local level, utilities in Altoona, Pasadena, Fort Wayne, or any of the other seven test cities are seeing the picture up close. And the uniformity of findings among the various locales is a strong indicator that they are well chosen as typical "test" cities.

The first report of moderately comprehensive proportions to be made to date on the test city findings was presented by Christy Payne Jr., vice president of the Peoples Natural Gas Co., Pittsburgh, before the Southern Gas Association's convention in Houston April 26 and the eastern regional sales conference. Mr. Payne prefaced his remarks with this shocking statement:

"There is no gas company in the country to my knowledge that isn't taking a shellacking from its main competitor!"

Mr. Payne reported on results of surveys in six of the test cities.* "The data from these surveys generally corroborate those national trends in domestic gas appliance acceptance that were shown in other studies made since 1950," he said. "These are the significant indications:

"1. Although gas continues to enjoy a very high degree of acceptance for cooking and water heating in *most* cities, electricity has already made or threatens to make serious invasion of these important loads. There seems to be a discernible variation among age groups; the younger women interviewed showed stronger preferences for electric than did older women. Incidentally, in all of the six surveys thus far made available, more than 90% of all those interviewed were women, and thus the results represent the housewives' viewpoints.

"2. The reasons stated for preferences for electric appliances over gas indicate that many preferences—and even stated buying intentions—are based upon emotional rather than reasoning factors. And in nearly all the cities surveyed, there were large numbers of those interviewed who *d d not even know* that there were such things as gas refrigerators and gas dryers.

"3. While large groups of households presently using gas appliances stated a preference to change to electric if they were to buy a new appliance now, very few of the present owners of electric appliances would consider a change to gas.

"4. More than 90% of the respondents in all of the surveys stated that they were satisfied with the amount of hot water available. This was true of *both* gas and electric water heater owners, including those households with automatic washing machines.

"5. In each of the cities surveyed, more than 90% of the gas customers who had at any time used the servicing facilities of the gas company stated they were satisfactory. Generally, smaller proportions of electric customers had used the service facilities of the electric company than had gas customers of the gas company, but they seemed equally satisfied with the speed and quality of that service.

"6. Insofar as *immediate* buying intentions were concerned, television sets were considered of more importance to many families than other household appliances. This is in the face of the fact that in many cities more than 25% of the gas ranges in use are over 10 years old. Here is an indication of the type of competition for the consumer's dollar that lies ahead—not just between similar products, but among *all* products."

Specific findings for specific appliances showed the following results, according to Mr. Payne:

Ranges: In one city, where the gas range saturation is now 83%, if everyone interviewed bought a range of her choice today, gas saturation would slip to 59%. In another city, the saturation loss would be from a present 92% figure to 64; and in a third, the respective percentages would be 85% and 65%.

"The upper income group—the opinion influencing group—intends to desert us in great numbers," he noted.

What are the reasons behind the choices?

"Those claiming a preference for electric ranges had more specific reasons for their choice than did those preferring gas ranges; they also felt more

*For a condensed version of the Lincoln, Neb. test, see May GAS, page 48.

strongly about their reasons. . . . Those preferring gas mentioned 'habit, or used to gas range' in 28% of the total replies. Those stating a preference for electric ranges mentioned 'cleanliness' in 66% of the replies.

"There are many reasons mentioned which are claimed by both those preferring gas and those preferring electric. This fact—plus the large number of those who vaguely say about gas that they "just like it"—is an indication of much misconception and plain lack of information."

Refrigerators: "There is still enough interest in gas refrigeration in some of the cities to encourage the gas companies to inform the public of its availability, economy of use, noiseless operation, and long-life dependability. A large proportion of those using gas refrigerators evince a tendency to remain with that type of equipment. . . . One city shows a 12% saturation and a 12% preference . . . another an 8% saturation and a 12% preference . . . and another a 15% saturation and a 20% preference."

As for reasons, here the situation was reversed. Habit was a more important basis for electric box preferences, while noiseless operation, economy, and general dependability were the reasons behind gas refrigerator preferences.

Water heaters: Future gains for electric models are indicated. Glamor and safety seem to be the prime bases for preference here. But "there are also large groups who state *no* preference."

More than 90% of all respondents felt that the amount of hot water they had available was adequate, even among those with automatic washers. "It is quite possible that many families do not realize (or expect) how large a volume of hot water can be made available quickly with properly sized automatic gas water heaters. There certainly seems to be room for consumer education here."

Gas dryers: The potential is good but most of the sales will be electric. Reasons for preferring electric were vague. "Confusions as to comparisons in original installation and operating costs are quite apparent," said Mr. Payne.

Advertising, servicing, and public relations: "Some of the companies in the action demonstration have found that their advertising has seemingly failed to hit the mark." In two cities, only about 20% of respondents recalled seeing gas company advertising. The best way to reach them, respondents in two cities said, was through TV.

"Surprisingly low numbers mentioned lower rates when asked for suggestions as to what the gas company could do to increase its service to the community . . .

"One city found that 43% of the gas ranges over 10 years old were owned by those classified as 'well-to-do.'"

What the companies in the test cities are doing: Summarizing some of the principal steps taken to rectify the situation:

"In one city, a letter was sent to all important gas appliance manufacturers and distributors in the territory re-emphasizing to them that the city is one of the 'pilot' cities. Attached to the letter was a recap of certain key results of the local market survey. The letter emphasized that the company will evaluate the potential market for each appliance in the territory; it emphasized the company's interest in upgrading the quality of appliances sold, and explained its role as coordinator in the promotional planning.

"A total of 147 manufacturers were contacted and there was a response from about 50%. Twenty-four manufacturers sent personal representatives to visit the particular company—(thus far)—in relation to this program.

"After analyzing their own operations according to the Gas Industry Development Program's 15 points, the following decisions were made:

"To have a special contact man for builders and architects in order to gain more of the new construction business.

"To have a full-time home economist for promotion of company sales only.

"To have a full-time home economist for promotion of dealer sales only.

"To have a special dealer contact man for the 40-odd dealers in the city.

"To agree to junk all company trade-ins.

"To up-grade heating units, emphasizing vented installations.

"Attempt to gain better sales data from dealers through personal contacts and reports."

One other company, which does not merchandise, but takes orders on company display floors for transmittal to dealers, has been conducting a free timer-control campaign, the cost being shared with the dealers. With 50,000 customers in the test area, per-customer advertising promotion budgets have been averaging $2.25 per customer. An extra $100,000 has been set up for implementing the action demonstration.

This company has a very active cooperative program with builders, contractors, and architects.

Still another company found it has been losing 1000 customers per year despite a $6 per customer ad-promotion budget. A four-day $20,000 Gas Show, open to the public, was held to spark enthusiasm for the program. A&P stores distributed more than 40,000 gas show shopping bags. Manufacturers participated and prizes were given.

Mr. Payne's conclusions were not startling (nor is the campaign itself startling), but his summation pinned down the "real value" in these simple terms:

"Many of us involved in the Action Demonstration Program have become more and more convinced that a 12- or 18- or even 24-month 'test period' is too short to measure adequately the full impact of the various added activities and changed organizational set-ups. We are coming to the belief that the real value of the activity can and must come from:

"1. A subjective evaluation of changes of attitude by consumers and all sales allies.

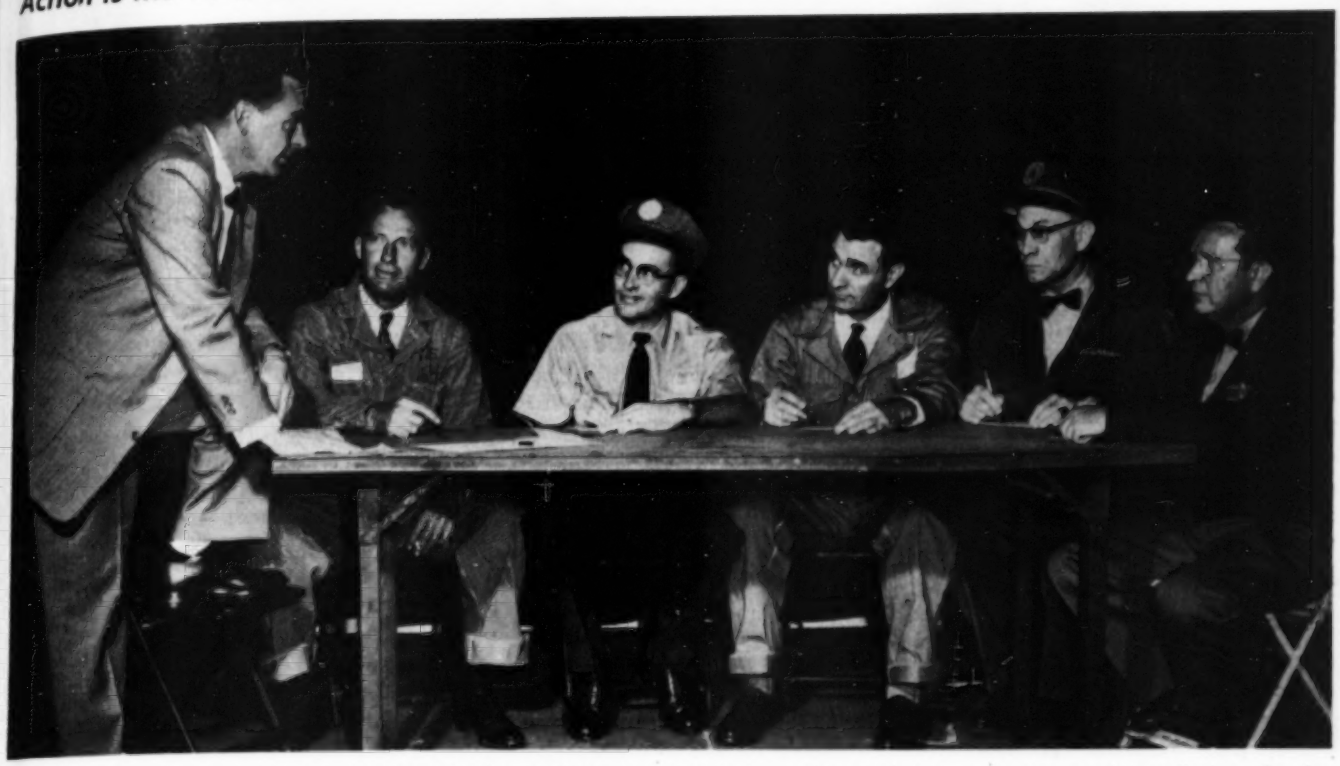
"2. The encouragement offered through these experiments to other gas companies to do more (the very fact of 'doing' and telling others about the 'doing' is valuable in itself).

"3. The critical internal company appraisal of its past practices and the effectiveness of the various new activities."

And once the internal appraisal and subjective evaluations have been made, what then? As must always be pointed out, there is no magic in the solution; nor is there anything particularly new in any of the marketing ideas that are being given a tryout. But a lot of them have been allowed to wither on the vine for lack of attention. Or lack of money to buy the much needed plant foods to keep them really strong, and really healthy.

Money is needed to nurture the ideas, and enthusiasm is most assuredly needed; a 100% participation by the elements of the industry is vital to the success of the program. But, in the final analysis, the program hinges on one simple word, which must be taken to heart and made the byword in every gas company function.

"Action" is the word.



The service department can be the starting point for needed improvements in appliance design, operation, and installation. At the Santa Barbara meeting these men took the roles of servicemen in acting out the part they play in a field-reporting system. They are (l to r): D. J. Hingley, So Cal; A. R. Wofford, Coast Counties; D. E. Hughes, SoCounties; D. T. Ward, SoCal; Emile Petersen, Mountain Fuel; and P. T. Bannerman, Totco.

Customer service has a vital role in implementing the GID program

GAS staff report

PRACTICALLY simultaneously with the delivery of the Payne report in Houston, a group of gas industry men whose chief concern in life is supposed to center around pliers, screwdrivers, and the 100 other peculiarly shaped apparatus that constitute the main tools of the customer service department of a gas utility, were mulling over their roles in the Gas Industry Development Program—and realizing that they were in a vital position to do infinite good, or infinite harm, to this nationwide marketing effort.

The center of attention was Santa Barbara, Calif., where some 300 Pacific Coast Gas Association members met to watch the unfolding of the most unusual customer service conference in association history.

Almost totally scripted—with the exception of half a dozen principal addresses—the program was a completely unified presentation of the vital part played by customer service in implementing many of the major points in GID. First there was a cleverly presented session which stated "The Need for Action." Following this was an explanation of the development program; and the final windup of the two-day conference was a complete recounting of ways in which customer service can go into action to support GID.

The conference, sponsored and directed by J. N. Schader, manager of customer service for Southern California Gas Co., offered a wide variety of fare, from talking gas appliances and a Dragnet-type skit featuring "Joe Monday" and his partner "Frank Everyday" ("that's us—Monday and Everyday") to a trumped-up "quarrel" among members of the audience—but always with a serious overtone of responsibility. And always with the single theme in mind—Gas Industry Development is the job of customer service, as well as of every department of every gas utility.

The primary emphasis was on the coordination of efforts among servicemen in the field, gas utility laboratories, and manufacturers, with a view toward upgrading both appliances and installations; making servicemen more aware of their key roles in promoting goodwill instead of bad; and, in general, bringing all the elements in the business into closer contact and cooperation with one another.

Management and public relations, too, were brought into the picture to show their interrelationships with customer service.

(The recounting of the program which follows is necessarily briefed to bare essentials, as the entire script occupied more than 60 legal-size pages, exclusive of the transcripts of principal addresses.)

The "Need for Action" portion of

A. D. Petersen, SoCounties, used talking appliances to demonstrate the complexity of modern automatic appliances. He emceed the "Need for Action" portion of the program.

the program, emceed by A. D. Petersen of Southern Counties Gas Co., Los Angeles, centered around the service problems of the gas companies. Through the employment of "talking" appliances, whereby a number of old and new ranges and other pieces of equipment were made to speak through wire recordings, the complexity of modern automatic appliances was illustrated. Old ranges, for example, which could be adjusted with a screwdriver and pair of pliers have yielded to today's intricate models requiring a hundred special servicing tools.

"These very features," said Mr. Petersen, "have brought on problems that indicate a need for ACTION. Specifically, some of these problems are:

"1. New appliances are complicated.

"2. New appliances are not always properly designed or assembled.

"3. New appliances are not always properly installed.

"In addition, the customer service departments of utilities are faced with still other problems:

"1. Adequate training of personnel.

"2. Rising costs of service."

To prove his point on complexity, Mr. Petersen showed color slides of a range, clothes dryer, refrigerator, and air conditioner as they look stripped of panels. Half a dozen slides were projected to show elements of poor design or assembly. For example - - -

A range whose top burners cannot be adjusted without removing them. ("This results in trial and error methods and adds considerably to the time required by the servicemen to make a relatively simple adjustment. And, too, the burners get awfully hot after a few tries.")

A nearly new water heater with badly smoked up surface above inspection door. ("It's a problem of burner design. Proper adjustment just could not be made on this burner.")

A range with manifold removed, which could be taken off only by disassembling of nuts and bolts ("a time-consuming job").

A range with a reset button for the 100% oven safety which is located in the upper burner compartment, making it physically impossible to push the button and strike a match to the pilot at the same time. ("So what happens when the housewife calls in because her oven won't light and the order clerk says, 'just press the button, madam, and light a match to the pilot'? You figure it out.")

Similar slides depicted poor installations—oven burner left completely out of adjustment, with the burner compartment sooted up; refrigerator installations in tight places that did not permit good, clean operation; water heaters in closets where controls are inaccessible.

Mr. Petersen also stressed the need for sound technical training of servicemen to work on today's complex appliances—as well as the need for a real grounding in public relations techniques. This latter point was tellingly illustrated with tape recordings of how one serviceman by his unthinking and irresponsible attitude left one housewife completely confused and disgruntled, while another, of the conscientious type, handled an identical call with tact and thoughtfulness, and left the housewife with a good impression of the gas company. And, not too incidentally, cleared the way for a dealer to make a sale of a new 30-gal. water heater.

"Are we sure," asked Mr. Petersen, "that all our servicemen make good impressions on customers? Do we have adequate methods of determining just what impressions are left, and are we giving proper emphasis to this phase of training? Not as much as we should, I am sure. This points up another *need for ACTION.*"

The Dragnet skit followed, graphically underlining the need for complete industry-wide coordination of efforts in eliminating service troubles and upgrading sales and appliances. Norman Wasson and Nathan Robbins played the roles of Monday and Everyday, two servicemen chatting during their lunch hour at Luigi's (Darrell Milton) Italian Kitchen. Monday and Everyday repeated the thesis that today's complicated appliances and controls pose difficult servicing problems.

"Take lint, for example," said Frank.

"You take it," retorted Joe. "I've had it for years. But the manufacturers are really working on that one—these low input pilots that don't use primary air and the snorkel-type pilots. That's the answer to the lint problem."

Conceding that "the manufacturers sure are working," Frank complained that after a manufacturer comes out with something new, the first time a serviceman sees or hears of it is in a customer's home. But his partner was quick to point out the fact that some of the information published by manufacturers is not read. "Sometimes we tag an appliance as defective when actually it's not," declared Joe. "It may not be working right, but if we knew our stuff we could fix it.

"Another thing, we run into a problem in the field, and the manufacturer never heard of it. If he had, he would be glad to fix it."

In conclusion, Joe decided that the problem of ironing out the field difficulties is "too big for us alone. It's too big for our department . . . for our company. It's a problem for the entire gas industry."

The next step in the program was an outlining of the Gas Industry Development program and "A Call to Action" by Vice President W. M. Jacobs of Southern California Gas Co. Mr. Jacobs traced the stages in the conception of the program, and told what has been accomplished to date. In speaking of the 10 "test cities," he reiterated the point stressed by Christy Payne in his talks that, while "obviously it will take time for the results to be available . . . it was certainly not intended that other companies mark time in their own action programs pending the outcome of the 10-city plan."

Mr. Jacobs also spoke of new minimum quality specifications for gas ranges, with standards drawn for three market levels—multiple housing, normal new and replacement markets, and deluxe markets.

"Perhaps the most encouraging result of all, to date, has been the renewed interest in appliance developments and improvements," said Mr. Jacobs. He cited some of the new ap-

pliance developments that have been outgrowths of the GID program. Included is the new super hush-hush top burner system for gas ranges developed by a well known Philadelphia industrial burner firm.*

In endeavoring to "scuttle any impression that may exist that this action program is limited to sales," Mr. Jacobs cited the fact that of the 15 so-called AGA action points, seven pertain to installation and service, and "nine or 10 of the 18 GAMA recommendations directly or indirectly go to some of these same points."

"In other words," he concluded, "sales and service go hand in hand."

In opening the afternoon presentation, Chairman Schrader reminded his audience that the problem had been presented, and the job now was to "determine how we, as customer service departments, can put this program into action." Nelson Hartleben of Southern Cal conducted the session, titled "Get the Facts."

The opening act was laid in a servicemen's meeting room. Several servicemen were sitting about, with their supervisor, writing up orders. Serviceman No. 1 spoke up to remark about a "jazzed up installation job" he had encountered that day. "The burners and simmers were overgassed and the pilot was so darn' high you could have boiled potatoes on it. . . . Here's an observation I wrote up on it."

A second serviceman registered dissatisfaction with the arrangement of parts in a new range which made it extremely difficult to work on. A third man had run into something on a forced air furnace that "looked like a solenoid but sure didn't act like one. . . . I'm going to send in an observation to see if we can't get some dope on this valve before I get stuck trying to fix one."

The supervisor remarked that such written observations provided the "ammunition for the needed ACTION."

Mr. Hartleben then explained the manner in which the observation program (such as the one in use at Southern California Gas Co.) can be handled.

"The mechanics of such a program work this way:

"1. Field observation forms can be included as part of the stationery stock on the service truck; thus, when a field problem with an appliance presents itself, it can be written up while it is fresh in the serviceman's mind.

"2. After review by the service supervisor, the observation can then be forwarded to the person or section assigned the responsibility of processing the observations.

"3. The observation should then be reviewed to determine what ACTION should be taken and who is best suited to take the ACTION.

"4. The observation should then be recorded in a log book and assigned a number.

"5. A copy of the observation should be made and forwarded to a designated person or section for investigation.

"6. When the results of the investigation are received a final answer can be prepared and sent to the observer's supervisor.

"7. The original copy of the observation and a copy of the answer should be placed in a field observation file for use in answering similar observations or reopening cases.

"The work of a field observation program is divided into two categories. They both are in the nature of requests that someone get off the dime and do something about certain problems. These range from complaints about poor installations and adjustments to unsatisfactory design and performance. Actually such a program is a means of field testing new appliances. The observations provide information on weakness of design that can only be determined by actual usage under varied conditions. It is true, of course, that with such a program many observations could be received that would appear to be reports of isolated cases and not a general condition. These observations can be held until a sufficient number of additional reports are received indicating that a general problem does exist and that some ACTION should be taken. I might say, however, that one company that operates a field observation program has had several instances of single reports of assembly line errors being brought to the manufacturer's attention and resulting in averting a general condition."

Where the reports show inherent design faults, the man in charge of the program refers the matter to a member of an AGA approval requirements subcommittee "for review and ACTION."

G. J. Sandusky of Southern California Gas Co., a member of several such subcommittees, then explained how the subcommittee can use the field observation program.

"These are actively solicited by the AGA approval requirements subcommittees, and are given careful consideration," he said. "This reporting is certainly one positive, specific ACTION that can be taken to implement ACTION Point No. 15: 'To accept the association's appliance approval requirements and testing programs as the basic and fundamental standard of the industry . . . the primary objective being to ensure a high degree of safe operation

Norman Wasson and Nathan Robbins portrayed Servicemen Monday and Everyday in the Dragnet skit, which unfolded in Luigi's (Darrell Milton) Italian Kitchen.

*At the request of GAMA, specific details of this exciting new development are being divulged only in meetings of representatives of gas companies, combination gas and electric utilities, and manufacturers, but are not being published in the trade press.

through the reasonable, expected life of the appliance.'"

Mr. Sandusky proceeded to detail and interpret the AGA approval requirements for gas appliances, and told of the continuing program behind these requirements.

"If the approval requirements program is to continue to grow and be strong, it must be understood and must have the support of its members. Once a decision is made, those members must abide by the decision of the majority. All too often those who should be completely familiar with the approval requirements program speak of 'laboratory' requirements. It should be emphasized that the requirements are actually industry requirements, developed and approved by the industry. The laboratories' testing, inspection, listing and labeling service operate within these requirements as directed by the industry.

"Manufacturers representatives of requirements subcommittees are nominated by the Gas Appliance Manufacturers Association. Such nominations are eagerly sought and appointments by the chairman of the approval requirements committee gladly accepted. This is corroborated by GAMA ACTION Point No. 15: 'That in addition to the continued production and distribution of AGA approved appliances, manufacturers endeavor to make fuller use of research findings and to engage in research on their own behalf. It was also urged that these results be recognized in a steady and rapid strengthening of the approval requirements.'"

Mr. Sandusky also told of the manner in which utility members are selected, but warned that a "let-George-do-it" policy will defeat the purpose of the subcommittees. Good men are needed, he declared.

"On the average, standards are revised about every two years. The process is a continuous one . . . new ideas and revisions to standards may originate from any one of a number of sources. They may come from consumer demands, from within or without the industry, from committee members or the laboratories, from problems or complaints originating in the field, from servicemen or manufacturers, or from introduction of new designs and materials calling for a revision of existing rules. The most important source, in my opinion, is field reports from servicemen."

Mr. Sandusky told how tentative standards are submitted "for criticism only" to industry members, but chided these same members for their failure, in many cases, to respond.

He then presented an example of how the reporting of field observations had established the existence of a water heater problem, and detailed the subsequent steps leading to the establishing of a standards requirement.

"Prior to 1945, water heaters were responsible for the primary cause of complaint in about 15% of customer requests for service. By 1947, water heaters as a primary cause of complaint had increased 21% and by 1951 to 31%. During 1952 and 1953 and so far in 1954, water heaters as a cause of complaint have leveled off to about 24%.

"In breaking down the figures of water heaters as a primary cause of complaint, roughly one-third of the complaints on water heaters resulted from burner problems, i.e., noisy operation, outage and sooting. In the eight-year period from 1946 through 1953, water heater burner complaints went from approximately 20,000 per year to approximately 100,000 per year.

"Considerable investigative work was undertaken, both in the field and the utilities' laboratories, in an attempt to fix the cause of these difficulties. These malfunctioning burners had two things in common—a very limited or no range of air shutter adjustment, and extremely small variations in primary aeration. Some water heater burners had simultaneous lifting and yellow tipped flame characteristics, while other burners changed from yellow tips to lifting with a very minute change in air shutter adjustment or with a slight accumulation of lint.

"The curves and data developed by the AGA Laboratories in their mixed gas and interchangeability research pointed the way to finding an answer to the problem. The curves show lifting, flash-back and yellow tip limits in terms of percent of primary air vs Btu per square inch of port area. The offending water heater burners were found to be operating in the unstable areas of these curves. The only field solution to this problem was to substantially derate the burner so the burner operated in a more flexible area of the curves.

"The field observations and investigations were reviewed by the AGA water heater approval requirements subcommittee in several of its meetings starting in 1949. In 1953 a partial solution to the problem was agreed upon and in its recent meeting this year the subcommittee agreed upon what appears to be a complete solution.

"The solution developed and agreed upon by the subcommittee is: First, all water heater burners must pass burner operating characteristics on Test Gas 'G' which is a 1400-Btu-LP gas-air mixture. Second, all water heater burners must be capable of being adjusted from yellow tips to lifting, must have primary air openings of at least 1 sq in. in area, and the primary air adjustment means must move at least one-third of its total travel in going from yellow tips to lifting."

Mr. Hartleben then gave several examples of the types of observations that are transmitted to the company's appliance testing laboratory, and what happens to them there was told by G. M. Van Ness, of the same company. Mr. Van Ness cited two applicable "action points"—GAMA Point 4, "That each manufacturer keep pace with competition by upgrading the performance and saleability of his goods," and GAMA Point 11, "That manufacturers shall build appliances of such design and construction that proper performance and operation may be obtained over a normal appliance life with minimum adjustments and parts replacements, and reasonable accessibility for such service."

"The prime purpose of a utility laboratory should be to find facts by testing appliances. These facts can be of service to the manufacturer. It should not be for the purpose either directly or indirectly of imposing any form of supplemental requirements on an appliance manufacturer.

"The team acts for the manufacturer every time a laboratory test report is given to him. In each report an exhaustive list of recommendations is made to the manufacturer. These are based on the standard of customer desires which have been, and are constantly being, analyzed. The facts of the report are taken not only from laboratory tests, but also from analysis of the accumulated servicemen's observations regarding the appliance. Numerous observations provide a means of measuring the extent of the problem, its acuteness, and give a clearer picture of its causes.

"The utility must equip itself with not only the facts of the field problem but also the facts of how the manufacturer operates. It is necessary to know how the manufacturer went about designing his product as well as his manu-

facturing methods, his quality controls, and his distribution procedures. The facts of the problem, that is, that an appliance is failing to do what the customer expects it to do—must be translated into the terms in which the manufacturer thinks."

Mr. Hartleben then reviewed the class of observations that indicate poor installations. He pointed out the connection between this problem and the GAMA Action Point 9: "That manufacturers, directly or through their designated representatives, make available to local installation and service personnel, adequate and readily understandable instructions, so that the appliance may be properly installed, adjusted, serviced, and operated, and make available to the customer readily understandable operating instructions"; and 8, "That manufacturers . . . provide replacement parts and local qualified service personnel for the installation thereof, and have them available promptly to the customer during the normal life of the appliance . . ."

Paul L. Speers outlined the PCGA program, which he is handling, on dealer and installer training. He related this activity to the development program by citing GAMA action Point 10 and AGA action Point 13, both of which pledge mutual assistance between manufacturers and utilities in providing such training.

"Past experience indicates that approximately 85% of all the field observations turned in by servicemen reporting unsatisfactory appliance installations, will report unsatisfactory range installations. This, I believe, is because of the high turn-over of range installers and the apparent lack of interest on the part of many range dealers, discount houses, etc. Most other gas appliances are installed by better trained, licensed installers and these other appliances account for only about 15% of the observations reporting unsatisfactory installations.

"The balance of these observations, most of them reporting unsatisfactory range installations, can be filed by division, district, city or sales area. On the first of each month a list of these observations, including the dealer's name, address, appliance data and type of error, should be forwarded to the sales supervisor for each area. This information will aid sales personnel in determining which dealers should be encouraged to attend training classes.

"I believe the customer service department should be responsible for conducting any installer training that is offered by a utility. However, the sales department should decide where and how often the training is needed, and through their dealer contacts, they should be responsible for promoting attendance at installation instruction meetings.

"When the sales supervisor sees a need for installer training in a certain area, he can contact the customer service training representative and arrange a location, time and date for the meeting. All dealers, in the area of the meeting location, on which unsatisfactory installations have been reported should then be contacted. One successful method of making these contacts is to have both a member of the sales department and the customer service department call at the dealer's place of business. The sales representative can introduce the service representative who is qualified to tactfully discuss the installation errors and offer assistance by inviting the dealer and his installer to attend the scheduled training meeting. This offer may be followed up by telephone calls or post cards arriving on the day or the day prior to the meeting. One company conducted 19 of these range installation and service meetings last year, with a total attendance of 426 installers; an average of 22 at each meeting."

Mr. Speers told how the PCGA sales and advertising section had allocated funds for development of dealer service and installation training material, as a means of carrying out the action points, and reported that the instructors' guide on range installation and service will soon be ready for distribution.

"This guide contains a complete script of the material to be covered and pictures of all the necessary props to conduct the meeting. With some additions, such as local code requirements, I believe any member utility will be able to use this material successfully in conducting range installation and service meetings.

"Your committee realizes that in one night's training you can't make a gas serviceman, but in one night you can train installers, who are doing this kind of work almost daily, to make a satisfactory range installation. On those rare occasions when installers agree to attend meetings for more than one night, this material can easily be expanded into several nights of instruction.

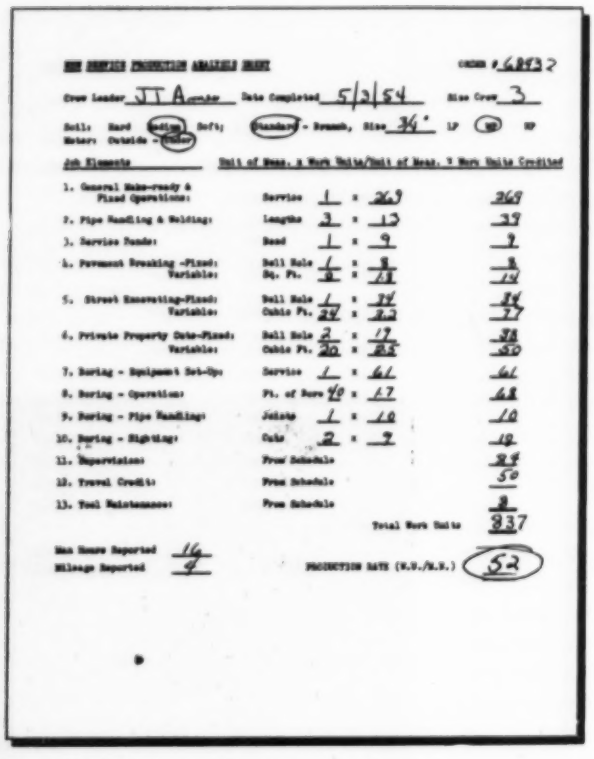
The program for the second morning centered about the theme of public relations, with an "impromptu" panel of quarrelsome representatives of various departments of gas utilities, speaking up from the floor, presenting arguments as to why their respective departments played the most important single role in breeding public goodwill. At the conclusion of their arguments, it was demonstrated how the job is actually one for the entire company, with all its departments cooperating and coordinating their efforts.

Representing the various departments were Georg Babbe, Southern California Gas Co. (distribution); George Coates, Southern Counties (customers); Pat Shea, Southern Cal (sales); and Gail Sandusky, SoCal (customer service).

J. N. Schrader (left), manager of customer service for SoCal, sponsored and directed the Santa Barbara conference. Discussing the conference with him are W. M. Jacobs (center), vice president of SoCal, and Nathan Gellert Jr., vice president of Seattle Gas.

In review, it was shown that the sales department is primarily responsible for the success of Action Points 1 through 4; the distribution department for Points 8 and 9; the customers department for Point 10; and the customer service department for Points 11 and 12.

The final phases of the program were devoted to addresses—"Public Relations—Corporate Good Manners," by Frank Sullivan, public relations counselor; "The View from the General Manager's Desk," by W. C. Eldridge, of Booz, Allen, and Hamilton; "The Staff Function in Management," by H. C. Connal, Southern Cal; "Unsafe Actions—Negative Reactions," by K. D. Brown, assistant safety engineer, Southern Cal—and a question-and-answer panel.



Crew Leader J.T. Aguilar Date Completed 5/3/54 Size Crew 3

Soil: Hard (Medium) Soft; Meters: Outside - (Inside) Standard - Branch, Size 3/4" LP (HP) HP

Job Elements	Unit of Meas. & Work Units/Unit of Meas.	? Work Units Credited
1. General Make-ready & Final Operations:	Service 1 x 269	269
2. Pipe Handling & Welding:	Lengths 3 x 13	39
3. Service Trench:	Feet 1 x 9	9
4. Pavement Breaking -Final:	Bell Hole 1 x 8	8
Variable:	Sq. Ft. 8 x 1.5	12
5. Street Excavating-Final:	Bell Hole 1 x 34	34
Variable:	Cubic Yd. 29 x 2.3	77
6. Private Property Ditch-Final:	Bell Hole 2 x 17	34
Variable:	Cubic Yd. 20 x 2.5	50
7. Boring - Equipment Set-Up:	Service 1 x 61	61
8. Boring - Operation:	Ft. of Bore 40 x 1.7	68
9. Boring - Pipe Handling:	Joints 1 x 10	10
10. Boring - Digging:	Cubic 2 x 9	18
11. Supervision:	From Schedule	95
12. Travel Credit:	From Schedule	50
13. Tool Maintenance:	From Schedule	2
	Total Work Units	837

Man Hours Reported 16
Mileage Reported 9
PRODUCTION RATE (W.U./M.H.) 52

Fig. 1. Calculation of the production rate for a service installation.

Part 3. Production standards and cost control: measures to continue cost reduction benefits.

Cutting costs in the distribution department

By **GEORG BABBE** · **Staff Engineer**
Southern California Gas Co., Los Angeles

I'D LIKE to have you meet Fred Fearless. Fred is the supervisor in charge of distribution department operations in the Typical District of the Natural Gas Co. His district encompasses roughly 60 square miles—some of it city, most of it suburban residential, with less and less of the district each year in the rural classification. Fred has some 25,000 meters to worry about—most of them domestic installations, quite a few serving commercial establishments like stores, restaurants and laundries, with some big industrial customers: a foundry, a steel forming mill, a steam generating plant and the like. The distribution system serving these customers is predominately welded steel although the older section is still faithfully served by bell and spigot cast iron pipe; the services are practically all steel with some soft-drawn copper inserted in older replaced services. About two-thirds of the district is low pressure, the rest medium pressure with a few high pressure services fed from the distribution trunk line that extends through the area.

Fred has one construction crew working on the bigger main installation and replacement jobs in the district; five smaller crews handling miscellaneous service and maintenance assignments; a leakage survey crew; three fitters on meter assembly work; and two general duty pre-inspection men. His total district complement, including two clerks at the base, is 40 men. In addition, Fred occasionally has a contractor's crew in the district working on big projects which can't be handled with the available number of gas company personnel.

Conscientious supervisor

Fred is a hard working, conscientious supervisor—he's the first at the base in the morning and the last to leave at night. He enjoys talking shop with the other district supervisors and is always alert for opportunities for improving his district's performance. During the past several years, Fred has become increasingly aware of the importance of his crews and particularly the crew leaders with regard to the success of his district and consequently his own success. When he was first promoted to district supervisor, he had the idea that as the boss, he would be running operations in the district. It didn't take Fred long to realize, however, that he couldn't hope to personally supervise more than a small fraction of the work going on at any one time and that his crew leaders for the most part would have to do their work with relatively infrequent direct supervision from Fred.

Supervisor's time

This frankly has Fred somewhat concerned at the moment. He realizes the importance of training his crew leaders as the basic means of improving performance in the district. As a matter of fact, he's just completed a series of meetings conducted by the personnel department in human relations and job training techniques which pretty clearly demonstrated the top brass' awareness of this same fact. The problem facing Fred at the moment is how to ration his time in working with the crew leaders. He doesn't have enough time to give each of them all the attention he'd like to—there are simply too many other demands on his time. So he wants to work first and spend the most time with those crews whose performance indicates they need the most help. Sure, he

has a pretty good idea of his problem cases—but in that human relations course he has also learned the hazard of basing an appraisal of an employee's performance on hunches or on casual observations. Fred wants to get the facts.

How can he get them? The obvious approach is to make a tour of all his crews and workmen, observe their performance for a long enough period of time to get a good picture of their work and then follow-up with those who need help most. This may not actually be so simple as it sounds though—remember Freddie is a busy boy. On a typical day, for example, Fred spends about 45 minutes getting his crew assignments adjusted to cover off absentee, discussing unusual jobs with two of his crew leaders, reviewing the facts in a claims case and writing his recommendations on the damage report. He spends an hour with a representative from the engineering department going over construction job plans and takes another 15 minutes of frantic telephoning to expedite a street excavation permit for a rush service installation for the mayor's brother-in-law. He has to spend another half an hour talking to an applicant for a helper's job and making necessary arrangements with the personnel department to get the man on the payroll and takes another quarter of an hour to review employee suggestions that the suggestion program staff coordinator has sent out for his consideration. With 15 minutes off for a much needed cup of coffee, Fred has five hours left for actual field observations—somewhat less than half an hour for each of the crews and employees working independently, which has to include the 5, 10 or 15 minutes it takes to drive out to where they're working. In addition, of course, Fred has a lot of other things to do and to look at whenever he is in the field.

Time element

Not much time to evaluate the overall performance of a crew, is it? And even if Fred could arrange his schedule to spend more time observing crew operations, he'd always be plagued with the question of whether their work during his visit is actually typical of their general performance. Perhaps we'd better consider another approach that will give a broader basis for judging field performance.

Well, Fred can have his clerk set up some production records for each of the crews. He can keep a summary of the work they've done—the feet of pipe installed, number of leaks repaired, the number of services put in, etc.—and relate it to the number of hours taken to do the work or get from the accounting department the cost of the work. This will give Fred an opportunity to compare production by using some index like feet-of-pipe-laid-per-man-day or services-installed-per-crew-day.

Some improvement

This is certainly an improvement over no factual data at all. But consider the problems Fred faces in using this information. One of his crew leaders gets a consistent production rate of 2.6 services installed per day; another is able to average only .8 of a service per day. The first crew's work, however, is predominately on tract installations in the suburbs, some of the services being installed before the main is gassed, and with only a few of the jobs requiring any pavement breaking. The second crew, on the other hand, is assigned mostly scattered installations in the downtown area, with quite a bit of driving required to get from job to job, heavy pavement has to be broken on most jobs—in short, its service installations just aren't the same breed of cat as those made by the first crew.

Of course the difference in performance and in job conditions for other crews may not be quite so extreme. In any event, though, Fred always has the problem in using his crude, historical indexes of trying to compensate for all the variables of job type and site conditions, which may have much more of an effect on the indicated production rate of the crew than does the effectiveness of the crew leader. Furthermore, since such an index is based on the historical average of past jobs, Fred has no real way of knowing whether even his best crew leader should be expected to do a still better job.

Let's face it. Fred and his fellow field supervisors in the distribution department have a rough supervisory chore. Their crews operate independently over wide areas, performing a multiplicity of work types under a wide range of operating conditions. Sure, an experienced field supervisor has a remarkably good picture of his crews' performance. The point is that he can do an even better job as a supervisor if he has a more objective and more comprehensive measure of work performance and if he doesn't have to "fly by the seat of his pants" in planning his own supervisory activities.

Crew Leader	Type of Work (No. of Jobs Reported)	Production This Month (w.u./m.h.)	Production Last Month	6-Month Average
1. J. T. Ames	Service installations (12)	52	51	51
	Meter assembly install. (8)	56	57	54
	Leakage orders (18)	49	52	48
	Composite	51	53	50
2. S. M. Jones	Service installations (10)	46	49	47
	Meter assembly install. (10)	49	50	48
	Service alterations (14)	52	50	49
	Leakage (2)	50	46	45
	Composite	48	49	47
3. B. J. Franklin	Service installations (19)	62		
DISTRICT AVERAGES				
	Service installations	56	57	56
	Service alterations	52	52	53
	Meter assembly install.	58	59	57
	Meter assembly alteration	61	58	60
	Leakage repairs	53	54	52
	Miscellaneous	59	56	59

Fig. 2. Monthly cost control report.

Application of time study data in performance evaluation

What does this have to do with a cost reduction program? Just this—the same time study technique that we discussed in the preceding article as providing a sound basis for evaluating methods and equipment can also be used to solve Fred Fearless' problem of performance evaluation. In the case of methods and equipment investigations, time study data enable the effect of all variables influencing production — amount of work, soil type, pavement

thickness, etc.—to be measured so that they in effect can be eliminated from the analysis, focussing attention only on the effect of the particular alternate methods or pieces of equipment being studied. With some refinements, the same basic approach can be used to develop a production index which compensates for these same variables and which, therefore, provides a much more reliable and useful measure of performance. A district supervisor who has such a measure of performance available to him can spend his time working with crew leaders with poor production records with a good deal of assurance that their records actually reflect poor job planning, improper balance of crew assignments, use of ineffective methods and the like, rather than resulting from consistently bad breaks with regard to travel time required, pavement breaking involved, or hand digging required and the like.

A summary of time study procedures

Books have been written about the industrial engineering theory and practice of time study and a detailed discussion of these procedures would certainly be beyond the scope of this series of articles. A brief summary of the basic objectives and general review of the approach followed may help, however, to orient our further consideration of the application of time study data.

The basic objective of time study, or work measurement as it frequently is called, is to develop a standard of performance in terms of time as a common denominator—that is, the length of time a particular job or operation might reasonably be expected to take, if performed by a qualified operator working at a reasonable pace, using the best known methods and standard equipment and materials.

In accomplishing this objective, the time study observer first reviews the job to be studied to become thoroughly familiar with all the operations required to complete it, the sequence of operations, the crew assignment for each operation, the equipment used, etc. He then uses a stop watch to determine and record the time actually required for qualified personnel to perform each of these operations to accepted standards of quality, at the same time recording the amount of work accomplished—i.e., the square feet of pavement of a particular thickness broken, the cubic feet of soil excavated, the number of welds made in pipe of a particular diameter etc.

These observed times are then adjusted to reflect the pace or speed with which the operator performed the work during the observation. If the operation was performed at what might be considered a reasonable pace, no adjustment is made. If the operator was working at an abnormally high speed (which is quite frequently the case during a time study), the observed time is reduced; conversely the observed time is adjusted upward if a slower-than-normal pace was observed. These adjusted times are called normal times.

A second adjustment is made to convert these normal times to standard times, reflecting the relative arduousness of each particular operation and including an allowance for personal time. The sum of what might be termed a fatigue or effort factor and a personal factor may vary from a low of 5%, for some light operation such as making out work reports, to a high of some 30% for more demanding operations such as pavement breaking or welding in the cramped quarters of a bellhole.

With these adjustments, the standard time finally calculated accomplishes the

basic objective set forth earlier. It represents the time a qualified operator should require to perform the operation studied, working at a reasonable rate of speed, using the best known method and available equipment and materials, and resting for a length of time appropriate for the effort required to perform the job. In a sense then, this standard time is a unit of work, in effect representing the amount of work that can reasonably be performed in a given time. As a matter of fact, in recognition of this fact standard times are frequently expressed as "work units"; in the discussion below, we'll use the term work unit as a standard man-minute's worth of work.

This unit provides a basis for evaluating performance in the following manner: The work content of the job as reported is analyzed in terms of the number of work units that each individual operation entails. The total of the work units for all operations represents the standard time or the time that the job should have taken; related to the actual time required, it provides a realistic index of production performance, which compensates for all of the variables that distort a less precise index.

Fig. 1 shows how the production rate for a service installation would be calculated. With this particular plan of calculation, standard or normal production would be expressed as 60 work units per man hour. The production rate of 52 attained in our sample situation in effect indicates that for every hour on the job, this crew has accomplished 52 minutes worth of work.

As we'll discuss in more detail in a later section, the production rate on a single job, particularly on a relatively small job such as a service installation, may not be truly representative of a crew's general performance rating. Furthermore, trends of performance level are frequently as important as current standings in the district supervisor's appraisal of appropriate follow-up action. Consequently these individual production analyses will be of greatest value if summarized in a monthly report such as that shown in *Fig. 2*.

As you might expect, the actual development and application of these standard times is not quite so simple or so precise as the general description above might indicate. A good deal of subjective judgment is involved in establishing the final standard time through the application of speed factors and fatigue allowances, as well as in the decision as to which of the actual observations to include in the summary on which the standard time is based and which observations to throw out. Consequently the basic data used do not have nearly the degree of objective precision that a measurement of some physical dimensions can have.

Basic restriction

Another basic restriction in the accuracy of a production report based on time study standards is the practical limit of the crew leader's ability to report work performed and conditions encountered. Theoretically it would be possible to develop standards based on all the work operations, elements and sub-elements that might conceivably be involved in a particular job and that would reflect every shading and gradation of operating conditions affecting the time required to perform the work

Even if the cost of the time study work required to develop such detailed standards weren't prohibitive—which it would be—you would still be faced with the problem of their application. In order to make use of such standards, the crews in the field would have to spend more time reporting the details of the work performed and the conditions encountered than they would take to actually install pipe. The department's general manager might understandably take a rather dim view of such antics, desirable as they might be from an industrial engineer's point of view.

As a practical matter then, the standard time developed must lend itself to an application in which a minimum of reporting on work performed and operating conditions is required. This means that each standard must encompass a reasonably wide range of work conditions and be capable of application within the limits of accuracy of field reports. In essence then, the standard should represent the time that could normally be expected for an operation on an average job of a particular type. On specific operations on specific jobs, the standard may not be accurate, but when applied to a group of operations or a group of jobs, it will provide a very sound basis for evaluating performance. And since it does reflect all of the more significant variables influencing production time, it still is a much more useful yardstick of production than indexes that cannot take these variables into account.

Since the accuracy of the standard (and hence of the production report based on the standard) is related to (a) the amount of time study effort expended, and (b) the degree of detail of field reports on work performed, it follows that the time invested in either element should be consistent with the relative significance of the job being studied and the need for a control index. Production standards can be based on relatively few time studies and brief reports for low cost, low volume types of work. More expensive jobs where more precise controls will pay off can justify more extensive time study and more detailed work reporting.

Use of production reports

As in the case of methods improvement studies, the value of these production reports is completely dependent upon their use by the district supervisors. It is essential that each supervisor understand the basis for the development of standard times, appreciate the limitations of the standards and the production reports based on them, and make use of the information they provide in the most effective manner.

Acceptance of standard

One of the problems faced with regard to the supervisors' acceptance of time study production standards is the common misconception of the standards as unrealistic and unfair features of a speed-up campaign. Certainly a sound standard should represent a challenging yardstick in that it is based on optimum utilization of equipment and manpower, on best methods and top quality job planning and execution. It would fail to achieve its purpose if it were based on second-rate operations. On the other hand, nothing in the standard represents a speed-up measure. The inclusion of speed rating and effort and personal allowances assures that the standard is based on a reasonable work pace and reflects the rest and personal time allowances appropriate for the operations involved.

As the supervisors accept the standards program, a real hazard exists in a tendency to use the production reports in a more specific manner than was intended in their development. This is a natural enough reaction—for years, the field supervisors have had only homemade and relatively crude measures of production. The standards program now gives them a more precise and much more directly useable index; the tendency is to use this index as a final determinant, rather than only as a general measure or indication of the actual situation which results in the index being what it is.

Here's an example of what I have in mind. Sam Jones is the working foreman in charge of a three-man service crew. His production rate for the past several months has been hovering around 48 work units per man hour, while the district average for the same type of work has been 56 work units. The district supervisor has two alternatives in correcting this situation. One way of handling it—the easy way, at least on the surface—is to call Jones into his office and lay it on the line. "Look here, Jones, your production isn't up to par. Your rate is only 48 and the rest of the district is hitting 56. Let's do something about it—quick!" A very brisk, professional sounding interview, but what good has it done? Jones knows he's working just as hard as any other crew leader—maybe harder. So he goes away, mumbling to himself about the blankety-blank system and the slave drivers they hire as bosses. If Jones does get his production back in line, it certainly won't be because his supervisor gave him any real help with the problem.

Operation or Element	Class of Standard	Labor			Equipment			Materials & Supplies		
		Actual $	Std. $	% Perf.	Actual $	Std. $	% Perf.	Actual $	Std. $	% Perf.
1. Main Installation	1	2,875	2,200	77	950	920	97	3,605	3,900	108
2. Main Replacement	1	1,840	1,600	87	425	495	116	2,040	2,000	97
3. Service Installation	1	905	941	104	85	85	100	1,015	1,015	100
4. Service Replacement	1	425	480	112	70	75	107	650	670	103
5. Service Alteration	2	85	85	100	70	70	100	85	85	100
12. Training	4	45	45	100	-			-		
13. Safety Meetings	4	30	35	100	-			-		
14. Overtime Premium	3	145	100	69	-			-		
15. Personal Expenses	3	18	15	83	-			-		
DISTRICT TOTALS - This Month		9,425	9,050	96	1,560	1,600	102	8,680	8,780	101
Year to Date				94			97			99

Fig. 3. Monthly field production summary.

The other approach takes a bit more time and effort on the district supervisor's part, but the results justify it. When the district supervisor sees that Jones' production rate is consistently below the district average, he takes this as a tip that Jones is one of his crew leaders who evidentally needs some special help. He makes a point of watching Jones' crew in operation in the field (he can afford to spend more time with Jones now because the district's production reports indicate that the other crews are doing a consistently good job and don't need attention at the moment.)

Over a period of time, he manages to diagnose Jones' trouble. Maybe it's that Jones himself is working too hard—with the other crew members standing by and watching him. Or perhaps he's

not doing a good enough job of crew coordination—keeping two men on a one-man job, for instance, and not having a logical sequence of operations planned. Or conceivably Jones hasn't done a satisfactory job of training the other men on the crew with the result that he has to do their work for them. In any event, the district supervisor now knows why Jones' production has been poor and he can talk to Jones about the *cause,* rather than the *effect.* Consequently Jones has something specific to work on; he's been given some information that will help him instead of antagonizing him. And the production reports will have begun to pay their way.

We've been focussing our attention so far on the application of production standards in the evaluation and improvement of field performance. The features that make these data so valuable in this respect also offer distinct advantages in other uses. Since these standards offer a means of rather precisely calculating the work content of any particular job, they can be used to good advantage in cost estimating. For the same reason, these standard times can be used to improve dispatching accuracy, to assist in assigning each crew a volume of work that they can reasonably be expected to complete.

In addition to these day-to-day applications, production standards can be of real assistance in more general applications—long-term work programming, budget estimating, forecasting personnel and equipment requirements, etc. And of course, the standards based on current methods and equipment provide a consistent and objective base against which new methods or equipment can be compared.

A further refinement: a cost control program

The production standards program that we've considered above provides essentially only an index of the utilization of man hours—which certainly represents a major stride in supervisory and management control of field activities. Such a program also represents the foundation for an even broader and more valuable control function, however, which has been utilized with considerable benefit by many industrial organizations for some time. I refer to a cost control program encompassing not only labor costs, but equipment, materials and supplies, and servicing costs as well.

A cost control program, in the sense that the term is used here, has two essential elements. One, the organization's accounting system is arranged to provide each supervisor with a periodic (for example, monthly) summary of all the expenditures for functions or activities for which he is responsible, i.e., his directly controllable costs. Second, paralleling this report of actual expenditures, each supervisor is given a related summary of what these expenditures should have been, on the basis of the amount of work performed. The variances between actual and standard costs for specific cost elements or specific functions or activities provide each supervisor with information as to the "problem" areas that most urgently require his attention. Each higher level of supervision and management is given similar reports for direct costs within its general control, these in essence being summaries of the data provided each of their subordinates and similarly highlighting the variances between actual costs and standard costs in their larger organizational units. At each level in the organization, the cost control reports provide an excellent device for "management by exception," supplying information on which the most effective use of supervisory and management time and attention can be based.

The real value of this program, as you can appreciate, lies in the yardstick of cost performance provided by the standard cost data. For direct labor and equipment and in general for service activities, these standard costs can be developed simply by an extension of the standard time data discussed earlier. Man-hour standard times can be converted simply into standard labor costs by applying the appropriate wage rates for the labor classifications involved. Essentially the same approach can be followed in developing standard equipment standard times and standard costs. Standard costs for materials and supplies can be established by studying usage patterns and by determining reasonable allowances for losses due to defective items, operating procedures, deterioration, etc.

One of the chief advantages of such a program is its comprehensive coverage of all direct costs. Naturally, some cost elements or functions are more important than others; and some are much more difficult to establish standards for than are others. Consequently several classes of standards may be used in evaluating actual cost performance, ranging from a thoroughly time-studied industrial engineered standard with a probable error of, say +2%, to a very broad standard based simply on the best judgment of qualified operating supervisors. With such a range of four or five classes of standards it is, of course, important to relate the indicated variance from standard to the probable range of error in the standard itself.

The type of cost control a district supervisor in distribution might receive each month is shown in *Fig. 3.*

Instituting such a cost control program is no simple task. The accounting systems of most utilities are geared to the reports required by regulatory commissions and modifying them to provide operating control data may be a complex and expensive undertaking. The time and effort required to establish realistic standards for all cost elements or functions is also a costly project.

The experience of most of the companies that have undertaken such a program indicates, however, that the savings obtained through its operation make these costs a very sound investment. The reporting of actual costs to the supervisors responsible for them in and of itself generates a cost consciousness of considerable direct value. And the comparison between actual and standard or "target" costs results in a searching investigation at all levels of management for ways and means of reducing actual costs to attainable levels.

In this series of three articles, we've explored several aspects of a long-term comprehensive cost reduction program. Suggestions have been presented for getting such a program underway on a sound footing. Examples of specific cost reduction opportunities have been discussed. And finally in this article, we have discussed the application of the time study and work measurement techniques used in analyzing possible improvements in methods and equipment first in a production standards program to provide operating supervisors with more useful information regarding their crews' performance; and second in an even broader control program that permits evaluation of all elements of cost performance.

Relief valves on customer meter sets

Survey shows advantages and disadvantages of these main types of regulators as used by five western utilities.

By **GEORGE M. FOX, Assistant Engineer** • Coast Counties Gas & Electric Co., San Francisco

THE problem of protecting against overpressuring at customer meter sets has become increasingly important to the gas industry during the past several years. Recent accidents that might tend to affect public acceptance of gas have resulted in an all-out effort by the industry to study its own weaknesses. Every reasonable effort is now being made by the utilities to protect the customer from the dangers of overpressuring caused by the failure of pressure control equipment.

Methods in use

Three methods of limiting gas pressure to a safe level are currently being used by utility companies. Some companies advocate the use of a valve that automatically shuts off the supply of gas in the event of a failure of the controlling regulator. Also advocated is the monitoring regulator, used in series with the controlling regulator. Upon failure of normal control the monitor automatically functions at a slightly higher, but still safe, pressure level. Perhaps the most widely used safety device is the relief valve, a valve that automatically discharges to atmosphere any gas that would tend to build the pressure in a system above the safe limits prescribed. In actual practice all three methods may be used and often are used by a utility company. It is not unusual to find a meter set using two of these methods in series to protect against overpressuring.

A survey has been made of the practices of the California utilities with respect to their use of relief valves on both domestic and industrial meter sets. No attempt will be made to present the relief valve as the best solution to the problem of overpressuring, but only as a solution common to all the utilities and deserving of study. First, let us briefly review the various types of relief valves currently in use.

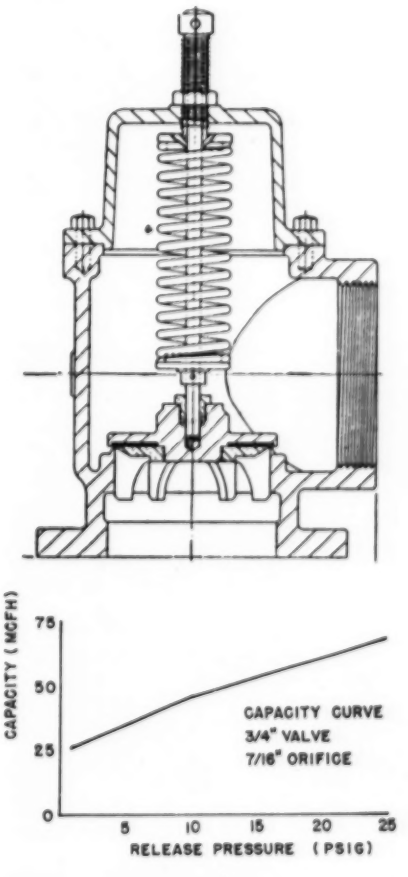


Fig. 1. Typical spring-type relief valve.

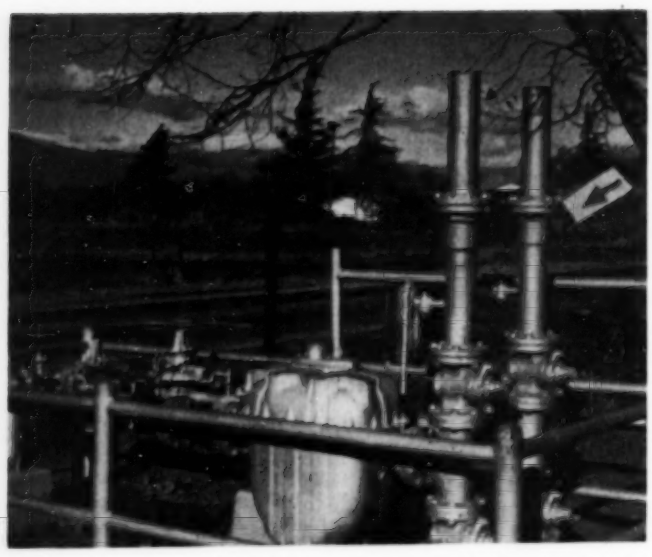
The relief valve

A relief valve, for the purposes of this discussion, is any device on a system of gas piping that will automatically discharge gas to atmosphere when the internal pressure of the piping reaches a predetermined level. Basically, there are six types of relief valves: the liquid seal, the weight, weight and lever, spring, back pressure regulator, and expansible tube. Only the latter three types are widely used in this area, and, therefore, the discussion will be confined to these types. The mercury seal relief valve, a low-pressure relief valve which would be installed downstream of the metering facilities, will not be discussed here. The problems inherent in the installation and operation of this type relief device have precluded its widespread application in customers' meter sets in California.

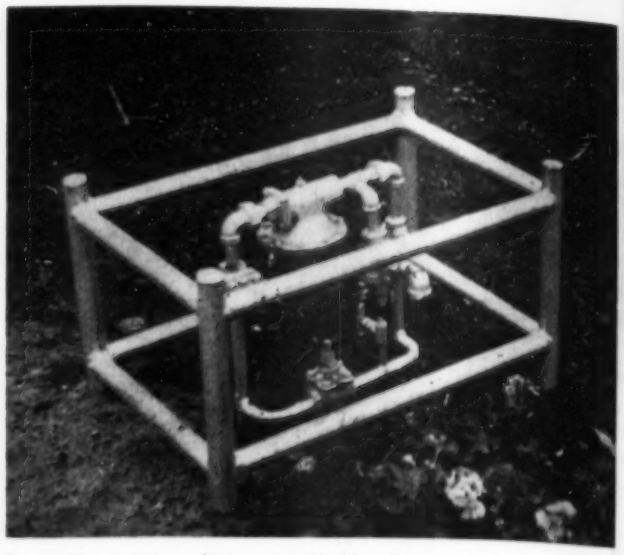
Types of relief valves

1. The spring type (see *Fig. 1*). This valve is generally a right-angle type valve, i.e., the inlet and outlet nozzles are at right angles to one another. When the conditions causing overpres-

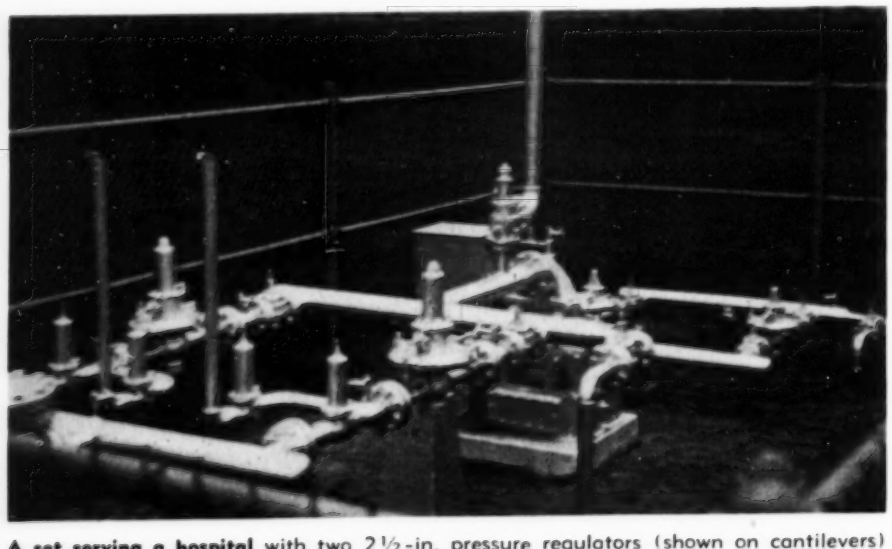
This article has been adapted from a talk presented at the PCGA distribution conference in San Francisco, March 9-11.



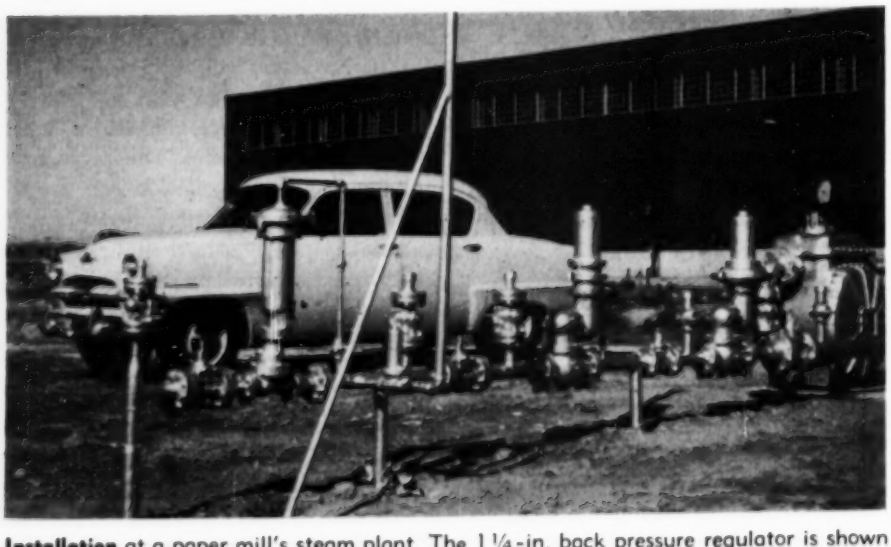
Set feeding gas engines for a water pump (4-in. spring-type relief valve off of a 150-psig feeder main. Relief setting is 15 psig). This relief valve has all working parts in the pipe itself. Note shutoff valves at inlet to relief valves are unlocked.



Domestic property line set with the ¾-in. spring type relief valve shown with vent in a downward direction (250 psig feeder main; relief set at 50 psig). Note bypass on set, which is not usual for small set.



A set serving a hospital with two 2½-in. pressure regulators (shown on cantilevers) protecting the regulators. One 2-in. x 3-in. spring type relief valve (in background) is protecting the meter. (250 psig feeder main.)



Installation at a paper mill's steam plant. The 1¼-in. back pressure regulator is shown on cantilever. (400 psig main; relief setting 55 psig.) Note extremely high stack used because of high wind conditions.

suring occur, the increasing pressure will act against the bottom of a seat (rubber or composition for low pressures, metal for high pressure). Acting against this pressure is a spring which holds the seat in a closed position. When the pressure builds beyond that pressure for which the spring is set, the relief valve opens. The valve will continue to open until the pressure is equalized on either side of the seat.

Inherent disadvantage

One disadvantage inherent in the design of this general type is the wide pressure range between "cracking" pressure and full discharge pressure. "Cracking" pressure is the pressure at which the valve will first begin discharging gas. It is not abnormal for the full discharge pressure to exceed 150% of the "cracking" pressure. This would prove to be a definite limitation where the normal operating pressure and the safe working pressure of the equipment being protected are very close. For this reason it might prove necessary to greatly oversize the valve in order to obtain the desired flow rate, yet limit the build-up in pressure.

Another disadvantage of the spring type valve is the metal seat used in those valves designed for use at intermediate and high gas pressures. When the valve discharges gas, foreign matter may cut or groove the metal seat and thus render it unable to seal satisfactorily when the pressure returns to normal.

The main advantage of this type of

relief is, in general, its lower cost. This is especially true in the pressure ranges where a cast iron body is applicable.

2. The back pressure regulator (see *Fig. 2*). This is a regulator with the pressure of the piping system that is being maintained acting directly on the control diaphragm. As the pressure increases, the force on the diaphragm overcomes the preset spring force above the diaphragm and, through a system of levers, causes the valve to open and the pressure to be relieved to atmosphere so that a predetermined maximum pressure may be maintained in the piping.

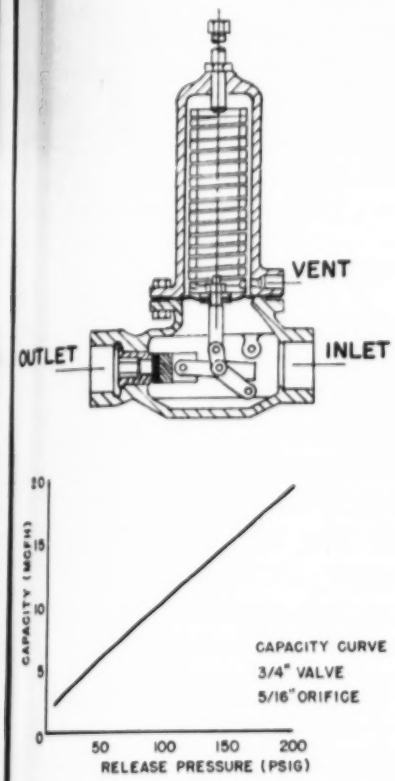


Fig. 2. Typical back-pressure relief valve.

This type, as opposed to the spring type relief valve, generally has a small range between "cracking" pressure and full capacity pressure so that a given size of regulator can be used to its fullest capacity advantage.

Cumbersome

This regulator is available in all pressure and capacity ranges, but for the high capacities often required, the equipment tends to be somewhat cumbersome and costly. Therefore, its most general application has been in metering installations requiring a relatively small amount of relief capacity. In such locations it has been found to be most satisfactory.

An additional advantage of the back pressure relief valve is the rubber, or composition, seat that affords positive shut off.

TABLE 1. RATING TABLE

Item	Relief	Shut-Off	Monitor
Equipment cost	1	2	3
Maintenance cost	2	1	3
Installation cost	1	2	3
Noise factor	3	None	None
Evidence of failure	1	2	3
Continuity of service	1	3	1
Discharge of gas to atmosphere	3	None	None

Legend: 1—Most desirable. 2—Desirable. 3—Least desirable.

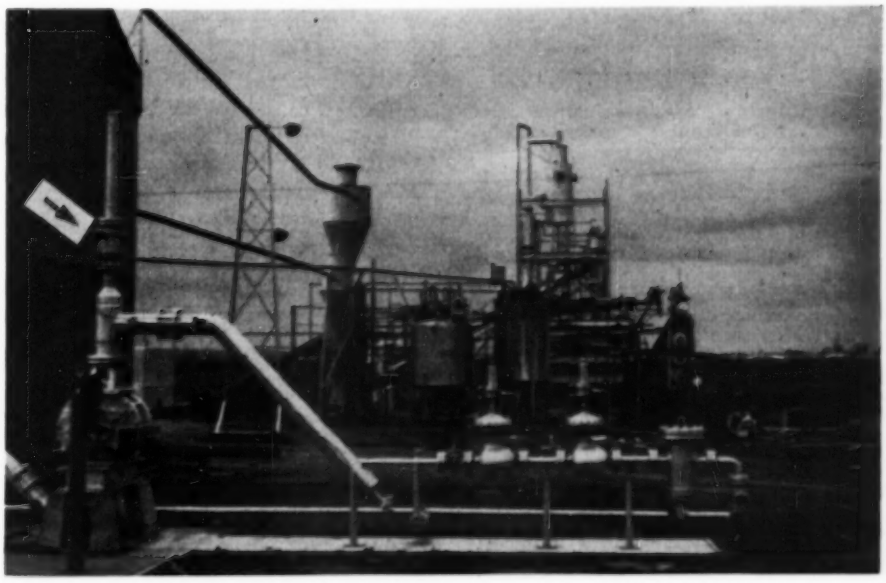
Recent addition

3. The expansible tube type (see *Fig. 3*). A more recent addition to the relief valve family is the expansible tube type. Pressure from the inlet side of this valve is introduced into the jacket space outside the expansible tube through a small orifice. A small spring-loaded relief pilot is connected in such a manner that an increase in the inlet pressure to the jacket will cause the opening of the pilot valve and so permit flow of fluid from the jacket at a faster rate than it can enter through the restricting orifice. As the jacket is emptied, the tube rolls from its seat on the core and allows sufficient flow through the valve to relieve the excess line pressure. When the excess has been relieved, the pilot valve again seats, the jacket refills, and the valve closes. Another model of this relief valve makes use of a gas-filled cylinder for control instead of the loading pilot.

In the low-pressure ranges, this type of relief valve has the disadvantage of the pressure range between "cracking" pressure and full discharge pressure. This range is brought about by the elastic tension of the rubber tube which must be overcome before full relief is possible. For this reason, the expansible tube relief valve is not used to relieve at low pressures. This valve is very satisfactory for installations requiring the discharge of large volumes of gas at intermediate and high pressures.

Additional advantage

Another advantage of the expansible tube relief valve is the positive shut-off afforded by the rubber tube seating around a metal core. The tube is made of a special rubber compound that has



A 4-in. expansible tube type relief valve (gas-filled control cylinder is buried) installed on a set feeding a fertilizer manufacturing plant. Feeder main is 250 psig; relief setting 55 psig. Upstream (first) regulator is a monitoring regulator.

high strength, tear and abrasion resistance. It is resistant to hydrocarbons and will not swell appreciably in normal service.

Advantages and disadvanges of the relief valve

Let us consider briefly some of the advantages and disadvantages of the relief valve when compared with the other methods of protecting against overpressuring customer installations. The rating table *(Table 1)* was compiled from the general experience of our company with these devices.

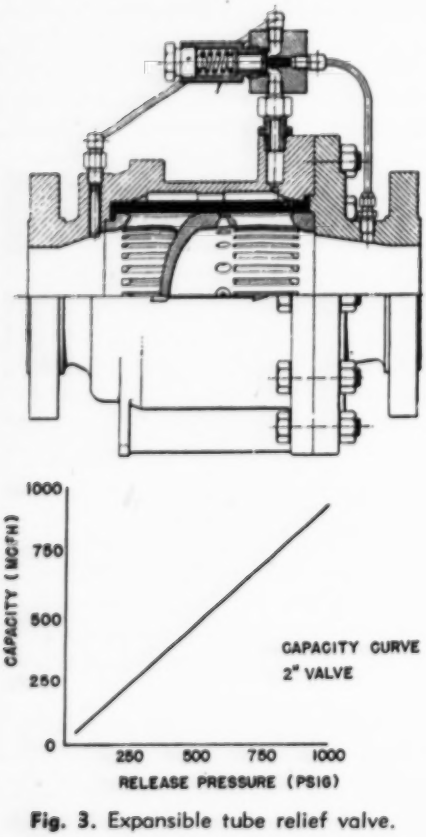


Fig. 3. Expansible tube relief valve.

The main advantage of the relief valve over the automatic shut-off valve is the factor of "continuity of service." In the event of failure of the controling regulator, the automatic shut-off valve will immediately discontinue service to the customer, but the relief valve will not interfere with the customer's supply.

Initial cost

The monitoring regulator will, in general, have greater initial, maintenance, and installation costs than the relief valve. However, the monitor has the advantage of maintaining gas supply to the customer without venting the gas to the atmosphere. This one disadvantage of the relief valve (venting to atmosphere) is its greatest drawback when compared to both the monitoring regulator and the automatic shut-off valve. Not only is there a loss of gas when the relief valve vents, but the noise itself may cause unnecessary alarm. If the proper precautions have been neglected, this vented gas could also constitute a hazard.

All of the factors listed in the table should be taken into consideration by the designer who is to decide upon a safety device for a particular installation.

Comparisons of the practices of five utilities

All five of the gas utilities contacted made use of relief valves for prevention of overpressuring customer facilities. This relief valve is employed between the primary and secondary, or service, regulator. One of the companies has recently begun using automatic shut-off valves on domestic services off mains delivering at between 60 and 350 psig. Off services which could be subjected to pressures exceeding 350 psig, both automatic shut-off valves and relief valves, operating in series at the inlet to the service regular, are used.

More than 60 psig

The company indicated in the preceding paragraph and two other companies install a relief valve on a domestic customer meter set whenever the feeder main exceeds a pressure of 60 psig. One other company sets 75 psig for its maximum, while the fifth company has set its standard at 100 psig. The companies favoring 60 and 75 psig as their limit base their judgment on the rated working pressure of 75 psig for the regulator in general use for domestic installations. The utility favoring 100 psig believes, through its experience, that the service regulator is capable of safely withstanding approximately 150% of rated working pressure.

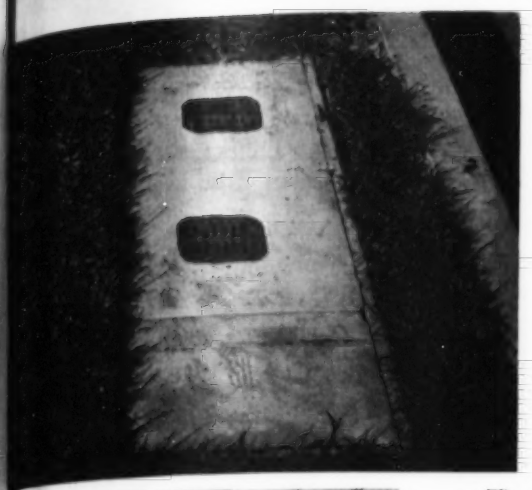
The standards employed by all the utility companies for large industrial meter sets are very similar. A safety device, usually a relief valve, is employed where failure of a regulator will cause dangerous overpressure to the outlet facilities. Thus, one or more relief valves or a combination of safety devices are installed in a set in order to protect the secondary regulator or the meter should the pressure at the outlet to the primary regulator be greater than the rated safe working pressure of the meter or regulator. The one company that favors the use of shut-off valves would use this device in place of, or in conjunction with, relief valves, depending upon the nature of the installation.

Method of isolation

Since relief valves will need maintenance at some time, a method of isolating the relief valve from the gas supply must be designed into the installation. One method, favored by some utilities, is to bypass either the valve or the entire installation. A second method, more commonly used, is to install a shut-off valve at the inlet to the relief valve. This gives rise to the problem of preventing the shut-off valve from being closed inadvertently. Most utilities using this method of isolation either lock the shut-off valve open with a company lock to which most gas department employees have access, or lock the valve open with a special lock to which only key employees have access. One utility company makes no attempt to lock or seal the shut-off valve, the reason being that greater damage can be done by an unauthorized person closing the inlet or outlet valve of the meter set than by closing the isolation valve.

TABLE 2. COMPARISON OF STANDARDS—FIVE GAS UTILITY COMPANIES

	1	2	3	4	5
1—Relief valve used on customer meter sets	Yes	Yes	Yes	Yes	Yes
2—Pressure limit of installation of relief valves, lb	60	60	75	60	100
3—Extensive use of other types of pressure limiting devices	No	Yes	No	No	No
4—Prohibit use of shut-off valves immediately upstream of relief valves	—	No	No	No	No
5—Shut-off valves locked open when used	—	Yes	No	Yes	Yes
6—Vent stacks	Yes	Yes	Yes	Yes	Yes



One method of venting to atmosphere: curb box in parkway area. Inside is a ¾-in. spring type relief valve set at 30 psig. Vents into box. Feeder main, 150 psig.

A ¾-in. spring type relief valve partially hidden behind and downstream of primary regulator at this space heating installation in a foundry. Note method of venting through a stack. Line pressure is 100 psig; relief setting, 30 psig.

Domestic meter set with a ¾-in. spring type relief valve used off 150 psig feeder main. Relief set at 60 psig. Note vent stack.

The general practice of California utilities is to find a suitable location for a relief valve away from the customer's premises when extending service off a high pressure gas main. The venting is normally directly from the outlet port without the aid of a vent stack. Most companies prefer an above-ground installation although there are many instances of below-ground sets generally prompted by the public relations angle. Whenever a suitable location is not available at this preferred distance away from the customer's house, the utility will install the relief valve at the house. A vent stack extended beyond the eaves of the house is normally used in this instance. One company, however, does not feel that vent stacks are necessary for this purpose since only small amounts of gas are usually vented. All of the companies mount stacks on relief valves on industrial sets. In view of the potentially greater amounts of gas to be vented, extreme care must be exercised to insure that these stacks are not terminated near windows or ventilation openings.

A summary of these comparisons is presented in *Table 2:*

Further complications

The problem of safe venting is further complicated by relocation and construction of buildings occurring after the installation has been completed. Hazardous conditions could arise through a lack of follow-up procedure by the utility. It is the duty of the field supervisor to see that all gas department employees are alert to these possibilities and that prompt action to clear potential hazards is taken when they are reported. Training of such men as the meter readers, who are in constant contact with field installations, would be advisable.

Annual report presented via TV

The Rochester (N. Y.) Gas & Electric Corp. tried something new this year in bringing its annual report to the attention of the public. A special half-hour TV show, unlike any other ever produced in Rochester, presented a documentary study of a *bona fide* customer in the community who asked the question "What do you do with the money I pay you every month?"

The show was advertised as "105," which referred to the number of years the company has operated in the community. The principal characters were a pair of shoes, a pile of coal, assorted numbers, and money. Top members of the utility's management participated: President Alexander M. Beebee, Executive Vice President Robert E. Ginna, Vice President and Comptroller Ernest J. Howe, and Leo H. East, vice president in charge of operations.

Screen and voice tests were conducted by TV stations WHAM for the typical customer.

The executives answered the questions put to them until Mr. Typical Customer found out what the company's responsibilities are to its customers, to its community, and to its stockholders; how his money was spent, broken down in portions of a dollar bill; and also how big the company is: the territory it serves, number of meters; how the planning department keeps ahead of demand, and how service is maintained, employee relations and activities.

Vice President East points out the company's service territory to Mr. Typical Customer during company's TV show.

Thermally Thinking

Continued from page 32

Mr. Lewis and his counterparts in the coal management field are standing side by side. They are doing everything possible to push through the Hunt bill, but are not likely to be successful, although only time will tell.

There has been interest, too, in the fate of the amendment to the tax revision bill, under consideration in the Senate Committee on Finance, which would cut from 27½% to 15% the depletion allowance made under present tax law.

This bill, which was greeted avidly by many Democrats such as Sen. Paul H. Douglas (D.-Ill.) and other self-styled liberals, was introduced by Sens. John Williams (D.-Del.) and George Aiken (R.-Vt.). There is strong support for it among a minority of the Republicans, too.

The amendment would require competitive bidding for federal oil and gas lands, instead of the present method by which one company can lease on negotiated price. This provision, if enacted, would require extensive administrative difficulties by the Department of the Interior, it is felt.

The fate of this amendment—and of the tax revision bill itself—was very much a matter of doubt, as Congress rounded June 1 and headed for what many hoped would be the home stretch. There is strong sentiment on Capitol Hill to adjourn by the end of July so that legislators can get a little vacation before entering the strenuous fall election campaign.

Brake for the price spiral?

There is intense interest in natural gas circles in the Federal Power Commission's announcement that it is considering the desirability of adopting rules designed to restrict greatly the operation of escalation and "favored nations" clauses in gas purchase contracts between natural gas pipeline companies and gas producers.

In its notice of proposed rule making, the FPC said that some of the natural gas transported in interstate commerce is purchased under contracts with producing and gathering companies, providing for automatic increases or escalation (in charges paid by the interstate pipeline companies) whenever a wholesale rate increase is permitted or whenever certain index figures are raised. Similar provisions, known as "favored nations" clauses, call for an increase in the price paid to a producer by the interstate transporter, if it or any other producer in the same field, or other defined area of production, receives higher prices from the same transporter or another transporter, or if a *bona fide* offer to purchase gas has been made to a producer within the defined area. The FPC feels that it should have information bearing upon whether any of these or similar contract provisions in fact have any reasonable relation to the economics of producing, gathering, or transporting natural gas.

The agency has allowed until July 30 for interested persons to submit to it data, views, comments and suggestions relating to a proposed rule to declare such provisions unacceptable as evidence of gas supply, or in connection with rate making. September 9 was fixed as the time for oral argument before the FPC on the matter.

Continued on page 64

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New Groove Type Metal Rim for greater rigidity and a perfect circle.

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New Improved Quality Rechrome Leather specially processed to Lancaster's own specifications.

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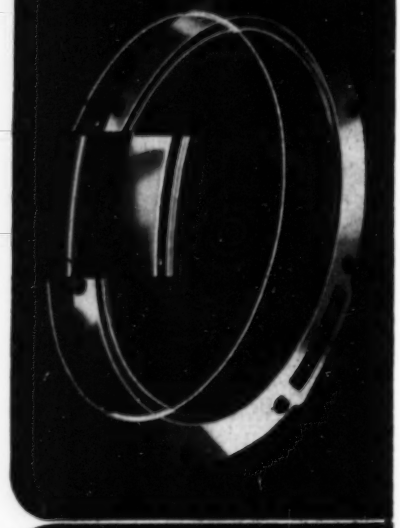

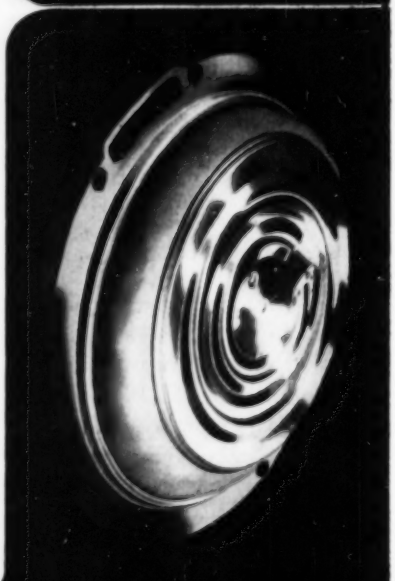

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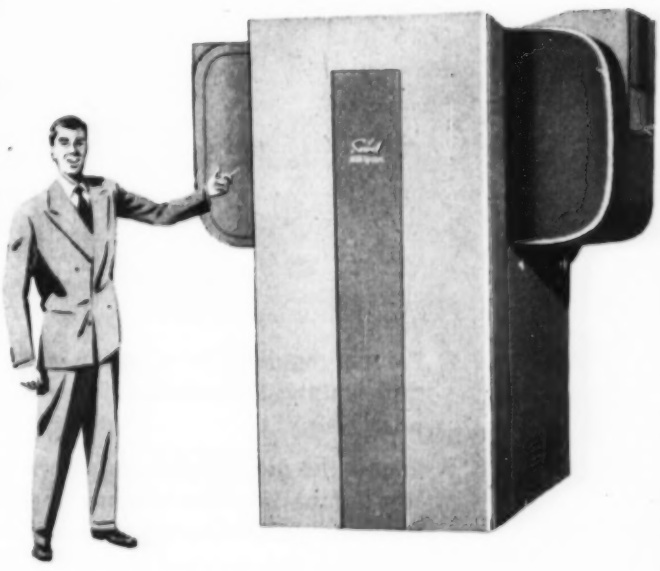

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The latchkey's out

From here it looks as if there may be some fairly strong signs that will tend to give us a more nearly integrated industry. They are scattered, to be sure, and seemingly unrelated, but they may well add up to a trend.

There are the obvious, of course. Foremost is the joint effort of AGA and GAMA under the Gas Industry Development Program, about which so much is currently being written (witness pages 45-51 in this issue). Recognizing the disheartening implications in the rapid slipping away of competitive advantages in the domestic appliance market, these two agencies a year or more ago pooled their efforts to produce a promotion and policy program intended to produce better customer acceptance and more sales. This in itself was a sign; not merely a sign of the recognition of a need for greater promotional effort, but of the need for cooperation between the two segments of the industry to produce that greater promotional effort.

Another straw in the wind is the cooperative moves on the part of the public relations groups with AGA, GAMA, INGAA, and others in setting up joint PR workshops. The very formation of the INGAA program, indeed, is a sign in itself, for no longer do the transmission companies feel removed— public-relationswise—from the ultimate customer. (How they seem to be feeling saleswise is another matter.)

GAMA, the bellwether, gave a sign too, when it started the whole thing several years ago. That sign was that the manufacturers of appliances, who weren't in really bad shape at all on a unit-for-unit basis, comparing today with 1940, could see the handwriting on the wall. An attitude of whaddayah-mean, we're-selling-x-ranges-for-every-1-range - we-sold-prewar - we've-no-cause-to-complain was not generally subscribed to. GAMA was to be commended for looking beyond the unit figures to the ratio figures on gas-v-electricity.

A lot of members of AGA, meanwhile, weren't looking at anything except those groaning househeating waiting lists and holding their heads.

There are other signs, not so obvious. FPC, in a move that must have taken a good deal of political courage, has placed a fair value on gas produced by a pipeline company. Subsequently, the commission took a slap at "escalator" and "favored nation" clauses in gas purchase contracts; prices are climbing too fast in the field. Coupled with the fair value philosophy, this might, if finalized, discourage some speculation and provide greater incentive for pipeline companies to produce their own gas. Another factor in this situation is the price ceiling effectively placed on natural gas prices by manufactured gas, as W. B. Tippy points out elsewhere in this issue.

As already indicated, some of these signposts are already being read—and seriously, too. But take the word of H. K. Griffin, who recently retired as president of the Southern Gas Association, their directions are not being followed with a firm enough tread.

Mr. Griffin, who is president of Mississippi Valley Gas Co., had some pointed things to say about gas indus-

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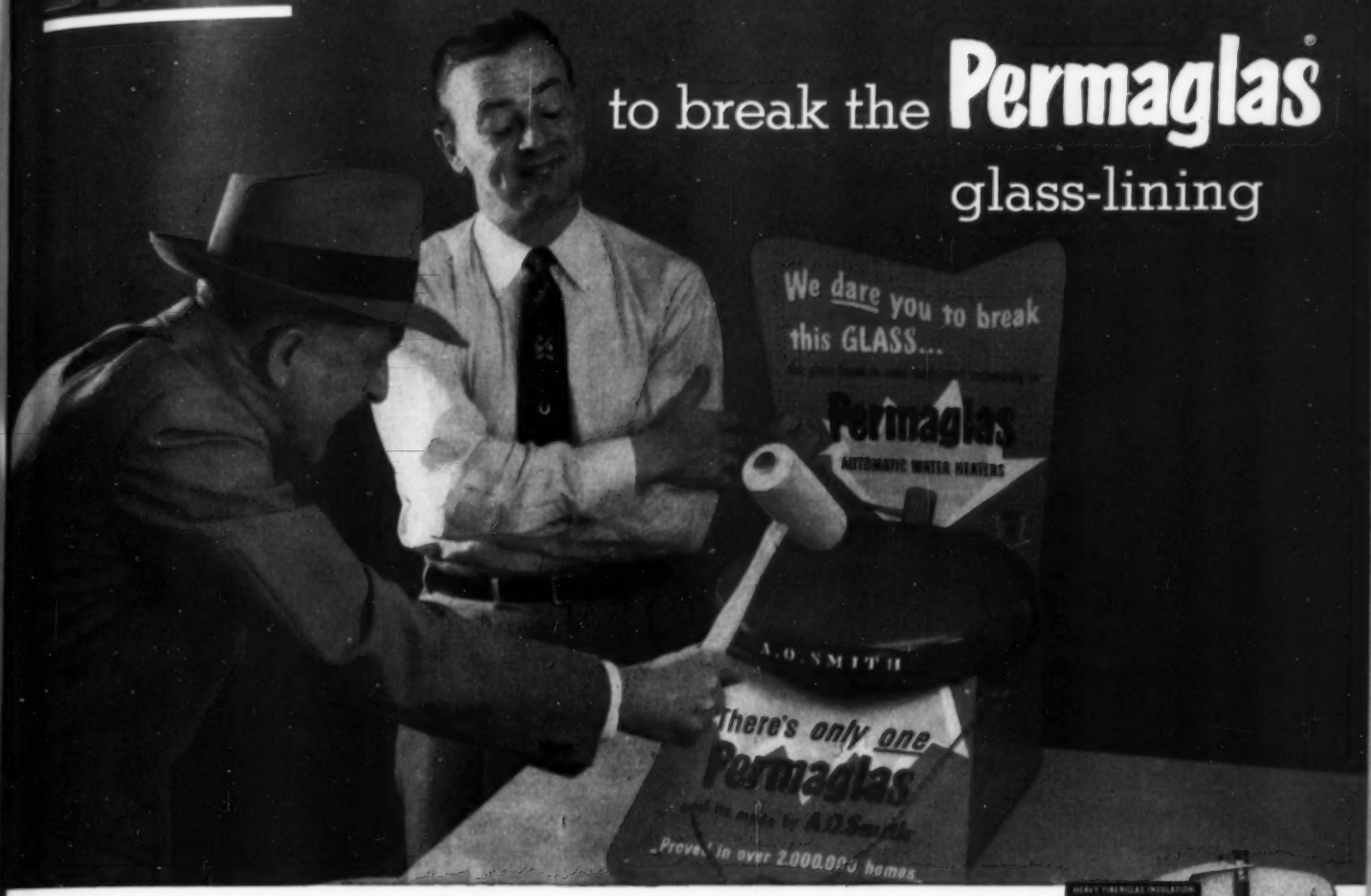

They can't do it! But let 'em hammer the facts home to *prove to themselves* how really *tough* the glass lining of *every Permaglas* water heater is! This . . . and the story you have to tell of the rust-free, sparkling clean hot water from a *Permaglas* will MAKE SALES time after time. It's a story of lasting dependability . . . proved only by *Permaglas* in over 2,000,000 homes!

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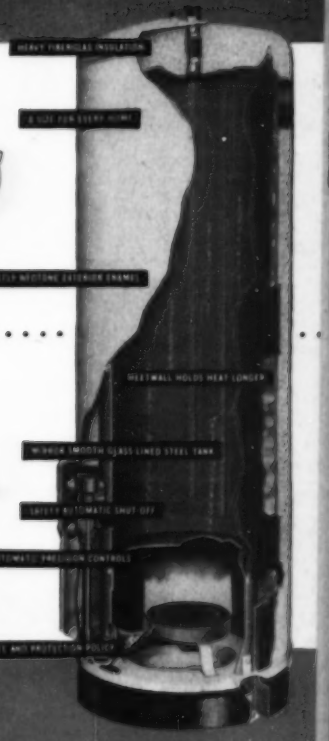

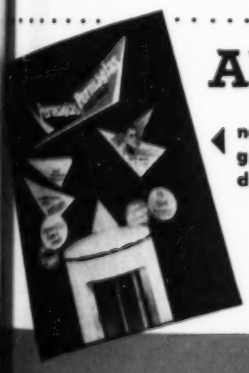

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try integration in his address before the recent SGA annual convention. Facing up to the fact that the electric industry *should,* by its very size, have about twice as many dollars to spend on industry promotion as the gas industry, Mr. Griffin termed it of the "greatest importance" that every dollar we spend for industry promotion be spent to yield the most productive results.

"Now consider . . . another comparison," he urged. "One that points up an inherent weakness of the gas industry. The electric business in most instances is carried on by self-contained organization, serving a relatively compact area, and having under its control the generation, transmission, and distribution of electricity. By contrast, the natural gas business is made up of three distinct parts, usually operated by unrelated companies, bound together only by contractual obligations, and over areas extending literally thousands of miles."

One result, he said, is that when new business opportunities are opened to an electric utility, almost immediate coordinated action "clear back to the electric generating end" may be taken. The gas distributor, on the other hand, must petition the pipeline company, which must search for more supplies, await FPC approval, etc.

One effect of the unintegrated characteristics is the lack of interest up and down the line in promoting the sale of gas, the lack varying in direct proportion to the distance from the market. At the furthest point, the producing group, having no contact at all with the ultimate customer, "has up to the present time utterly ignored any suggestion that it too should be concerned with the promotion of the industry from which it receives its money."

"In the producers' opinion, all gas that can be found can be sold, so the long-range view seems to interest them not at all," he said. "But wellhead prices have been increasing in recent years and we have a right to expect that as the producer gets more for his gas, he should be willing to contribute something to the promotion of the use of gas."

Another comparison cited was the integration of manufacturing lines to the point where the larger manufacturers of electrical equipment cover the field "from power plant to light bulbs." Obviously, each company is interested in selling more electricity, not just more transformers. "No wonder that millions of dollars, far more than would be available from the appliance business and the electric utilities alone, are available for advertising the electric way of living, as has been so skillfully done.

"Look at the situation in the gas industry. The manufacturers of *our* production plant — steel casing, drilling equipment, and contractors—show no interest in our problem." Nor have the other equipment manufacturers, he charged. "So again, in glaring contrast . . . we find ourselves under the handicap of the apathy shown toward any gas industry promotion by many of the men who have reaped so much from its growth.

"As was said earlier, it is quite obvious that we need more promotion and more effective promotion. As to the 'more' aspect, it would seem that, considering the relative sizes of the electric and gas industries, there should and must be at least as much money available as is now being spent if a fair degree of success is to be attained. Further, if elements of the industry are now contributing to promotion efforts could be persuaded to change their

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National promotion—month after month, year after year, hit after hit!
Powerful, compelling ads tell a powerful Hamilton story ... a continued story that means continuing sales support for you!

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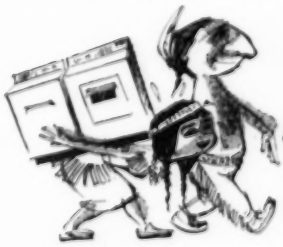

Hamilton
the folks who made automatic washdays possible
Hamilton Manufacturing Company, Two Rivers, Wisconsin

viewpoint, perhaps three times as much support could be obtained. That would put it in direct ratio to the electric industry—half its size, half its promotion dollars.

"Even this would leave us facing the necessity of getting the greatest possible result from every dollar spent. That can only be done by adopting a well planned, fully coordinated, industry-wide program. It would not be an easy task.

"Many leaders in our industry have given a great deal of constructive thought to industry promotion plans. A number of excellent programs have been devised by AGA, INGAA and GAMA. A great deal of lip service has been given these programs but financial support and their active adoption by individual companies have been disappointingly small. The reason for this is somewhat difficult to pin down. In some instances companies still seem to be somewhat hypnotized by the tremendous growth since the war, the continuing demand for additional natural gas, the thousands of unfilled applications for househeating service and the impact of the introduction of natural gas. In some instances, many reasons are quoted to show that the particular company being solicited for support need not, should not, or cannot join in such industry-wide activities. The handwriting on the wall with reference to our basic load does not yet seem clear to many in our industry.

"Excellent as all these individual programs are, however, they cannot possibly be as effective as could one industry-wide, skillfully created, fully integrated program. These promotional efforts should, for maximum results, be combined into one coordinated plan. Additional financial support will have to be secured and industry-wide participation will be necessary if any substantial degree of success is to be attained. A great deal of thought and effort is being devoted by some industry leaders to these objectives, for they realize time is slipping by and we could arrive too late with too little. It is to be hoped these efforts will meet with success for the time has arrived for action. That holds the only possibility for the reversal of the present trends in the industry and the regaining of the dominant position it once held."

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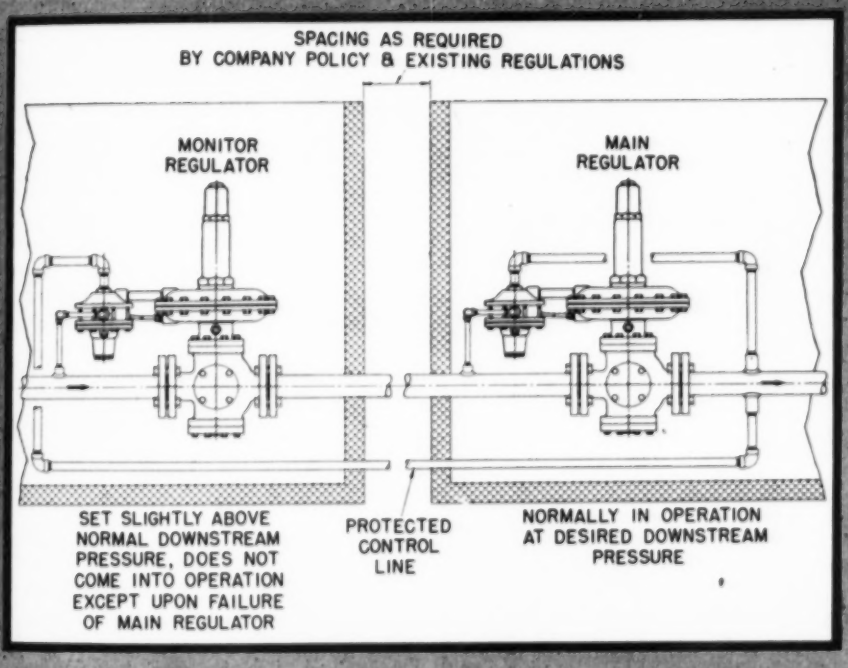
Good press relations at work

"Political opportunists took advantage of the (natural gas rate increase) situation to charge the power company with robbery and the public service commission with selling out the people. The attack was led by Attorney General Arnold Olsen, whose political future is as hemmed and hawed as a mule in a box stall. However, for once a big corporation got up on its hind legs and fought back. Jack Corette, a native son and president of the Montana Power Co., put on the war paint with intentions to slug it out with Mr. Olsen and any and all others who proposed to slander his company. Mr. Corette is off to a flying start and will thereby win the respect of Montana folks—even including those who are paying the increased cost to say nothing about us folks who want the gas. When a corporation feels its cause is just, it should get out and fight to win as would an individual. A lot of us think the Montana Power Co. is a good Montana outfit and entitled to a fair profit on its investment in material and brains. It is one of our largest taxpayers. In fact, it is one of us. Let's treat it fairly."

—Missoula (Mont.) Times

SAFETY OVER-RIDE REGULATOR SYSTEMS



Essentially, an over-ride regulator system is one in which an auxiliary or "monitor" regulator assumes pressure control at a slightly above normal level in case the main regulator fails in open position. Object: SAFETY.

A typical arrangement, one of several to be considered, is shown here. Fisher Type 298 regulators are being used.

Fisher Governor Company can send you drawings showing many other types of over-ride regulator installations as well as the names of utilities using them.

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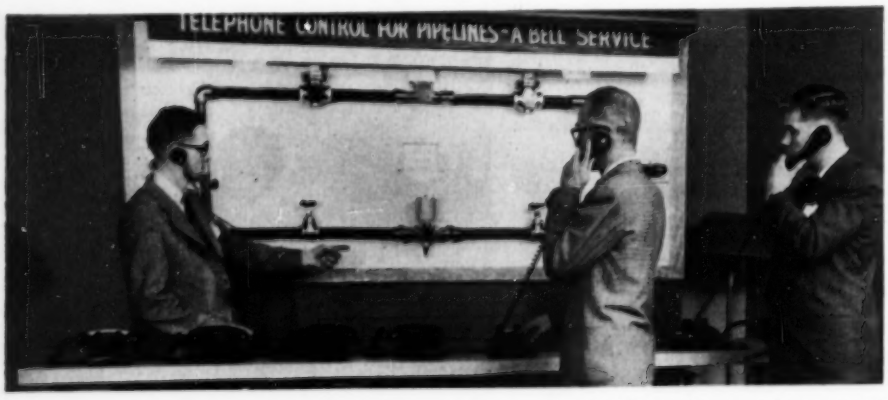
BETTER GAS PRESSURE CONTROL

Dr. Robert I. Leininger (left) of Battelle, who reported on the research study on thermoplastic pipe test procedures in progress at Battelle, and Guy Corfield, chairman of the AGA subcommittee on plastic pipe standards.

Panel group on meters and metering (l to r): Gilbert Estill, Oklahoma Natural; Charles Sevey, SoCal; B. F. Worley, United Gas; J. W. Chrisman, East Ohio; J. T. Stine Jr., New Orleans Public Service; Frederic Peters, New York State Electric; Elmer Becker, Citizens Gas & Coke; Ralph Davis, Long Island Lighting; James Webb, ConEd.



Telemetering and remote control demonstration set up by Bell Telephone to show use of Bell System facilities in distribution system operations. By dialing code numbers on the telephones, delegates could open and close valves on the piping system.

Panel members who took part in the luncheon session on construction and maintenance (l to r): H. T. Libby, B.C. Electric; R. A. Zimpfer, Columbia Gas; John Lindquist, Philadelphia Electric; W. R. Kubista, Oklahoma Natural; K. W. Person, Minneapolis Gas; R. C. Holcombe, Philadelphia Gas Works; A. G. Barkow, Natural Gas Pipeline Co.; W. A. Martin, Hydro-Electric Power Commission; E. G. Watkins, ConEd.

ASSOCIATIONS

Diverse subjects feature distribution conference

The diversity of fields with which the present day engineer must be familiar was evidenced in the range of subjects discussed during the AGA distribution, motor vehicles and corrosion conference in Montreal, Quebec, Canada on April 20-23.

Many of those attending the meeting found subjects of particular interest in such diverse sessions as that having to do with plastic pipe standards and that concerned with new developments in meters and metering. Although related in the sense that both are the concern of the distribution engineer, in one instance the engineer found himself involved in a discussion of the basic chemical and physical properties of various plastic materials from which tubing may be extruded and in the other instance in a discussion of the economic factors in a present-day meter repair program.

In other instances the same engineer found something of interest in the session on the application of hydraulic systems to various powered equipment and also in the discussion of various types of pipeline coatings for corrosion protection. While functionally related in many instances, the subjects have but little in common from an engineering point of view.

None of the sessions drew a wider range of interests than the one on plastic pipe standards. Although it was held on the afternoon of the last day of the conference, ordinarily a dead spot in any meeting, the session held a capacity audience of gas industry men and suppliers' representatives until well after the closing gavel.

Guy Corfield, chairman of the AGA subcommittee on plastic pipe standards, presided over the discussion and gave a report on the work of his subcommittee. Dr. Robert I. Leininger, associate chief of the rubber and plastics section, Battelle Memorial Institute, Columbus, Ohio, reported on the research study on thermoplastic pipe test procedures in progress at Battelle under the sponsorship of the Society of the Plastics Industry. He indicated that information on pipe bursting strength and cold temperature data should be available within a year.

Other members of the subcommittee who took part in the panel discussion on the use of plastic pipe included Lou Perrault, the Perrault Fibercast Corp.; Robert Bell, Carlon Products Corp.; and Fred Bunnell, Consumers Power Co., Jackson, Mich. Each member of the panel outlined one phase of the progress of plastic pipe in the gas industry. It was emphasized that the plastic manufacturer should be consulted before any installation is made using the product of a local extruder.

Of more than average interest were the sessions on meters and the design and operation of meter repair shops. The capital in-

Caloric's dramatically new built-in gas cooking units give new freedom in kitchen planning. Another Caloric product, planned to pay off for you . . . and like every Caloric appliance, it is planned exclusively for gas

No wonder Caloric built-in gas cooking equipment is gaining fast acceptance. It affords builders, architects and home owners an unmatched flexibility in planning kitchen layouts. Of course, these Caloric units offer the many advantages of gas equipment, including eye-level visibility for controls . . . and no worries about broiling with the oven door open. There's no doubt about it . . . feature for feature, dollar for dollar, built-in Caloric units offer more for less than any other on the market. Ask your Caloric representative to explain why Caloric built-in units are so vastly superior to all others.

Please send me complete information on the Caloric built-in gas cooking units.

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CALORIC

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vestment that the average gas company has in residential meters together with the cost of meter repair came in for discussion with respect to the use of the so called "disposable" meter.

The present-day trend toward the mechanization of meter repair shops was discussed at length in several of the sessions. G. K. Bachmann, Public Service Electric & Gas Co., of Newark, N. J., described the newly developed automatic proving devices that are a part of his new meter shop at the first luncheon meeting on meters and metering. The general subject of mechanization in meter shops was discussed by R. A. Seifert, Cincinnati Gas & Electric Co., at the second day's general session. At the second luncheon session on meters and metering a panel group discussed the matter of safe practices in the meter repair shop. Included on the panel were Gilbert Estill, Oklahoma Natural Gas Co., Tulsa; B. F. Worley, United Gas Corp., Shreveport; and Charles Sevey, Southern California Gas Co., Los Angeles. The session was moderated by Frederic Peters, New York State Electric & Gas Corp., Ithaca.

The interest expressed by this conference in the economics of meter shop operation is due to the steadily increasing cost of operating repair facilities, including the overhead involved. It was pointed out that most of the larger gas companies have already abandoned the use of small shops scattered about the system in favor of a centralized repair facility. The next step, which was discussed at length at the conference, is the use of the most modern mechanized methods of production to further reduce the costs of meter repair.

The matter of the design of a residential meter that can be more readily repaired, preferably on a production line, was discussed as a part of the subject of meter shop economics. This led, also, into a discussion of standardization as it applies to meter design. It was pointed out that a lack of standardization among meter manufacturers has, to some extent, made it impossible to apply a program of production line repair. At the same time, however, it was emphasized that this lack of standardization was largely due to the gas industry's own reluctance to get together on a standard meter design.

A demonstration and talk on telemetering and remote control, sponsored by the Bell Telephone Co., drew the interest of conference delegates. The demonstration was in the form of a graphic panel board with a simulated distribution piping system including valves that might be remotely controlled. By dialing a telephone adjacent to the board it was possible to open or close any of the valves on the demonstration board.

A paper on the application of telemetering and remote control of pipelines through Bell System services was given at the distribution design and development luncheon on the final day of the meeting by D. M. Edmonds, area sales manager, the Bell Telephone Co. of Canada.

After a review of the types of services available from the Bell company and the advantages of making use of these services, Mr. Edmonds went on to describe several specific installations that are now in operation. One of these was the selective calling channel network designed specifically for the Mississippi Valley Gas Co. by the Bell Laboratories. Based on simple telephone switching principles, this system is capable of handling over a single intercity channel a total of 99 separate remote control and indicating functions.

One intercity channel connects a dialing selector at Jackson, Miss., with receiving selectors in telephone offices in seven other communities. By dialing appropriate codes the dispatcher can select any one of the 46 channels radiating from these points and read the meter to which each channel is connected. Pressure and flow readings from the distant locations appear on receiving meters on the dispatchers control panel.

E. G. Peabody to head Indiana gas group

E. G. Peabody, executive engineer of Citizens Gas & Coke Utility, Indianapolis, was elected president of the Indiana Gas Association at its annual convention held recently in French Lick, Ind.

During the two-day affair, which was the 44th annual meeting of the group, James J.

WHIP

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CONTRACTION
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MECHANICAL JOINT CAST IRON PIPE

Practical water or gas distribution men well know that pipe line settlement, expansion and contraction from season to season sometimes cause joint leaks in bell-and-spigot pipe lines.

This kind of trouble may be prevented in future pipe line construction by the use of McWane-Pacific Boltite mechanical joint cast iron pipe. Boltite mechanical joints stay flexible; permit settlement, expansion or contraction without leakage. The special bolts, glands, and sealed-in rubber compound gasket last as long as the pipe.

For details, wire or write McWANE CAST IRON PIPE COMPANY, Birmingham, Alabama, or PACIFIC STATES CAST IRON PIPE COMPANY, Provo, Utah. (Sales offices in principal cities.)

McWANE PACIFIC PIPE Lasts for Centuries

Oates Jr., chairman of the board of Peoples Gas Light & Coke Co., Chicago, spoke on "Public Relations for Public Utilities"; John Fistere, director of sales development for *Fortune Magazine*, on "The Challenge in the Present Economy"; Dr. Melchoir Palyi, economist, on "The National and International Outlook"; and Maurice R. Granery, department of industrial management at Purdue University, on "The Key to Effective Supervision."

A. B. Brown, president of Southern Indiana Gas & Electric Co., Evansville, was elected vice president and Victor C. Seiter, Citizens Gas, was re-elected secretary-treasurer.

Round-table discussions highlight sales conference

A highly successful new format of round table discussions covering nearly all aspects of base load gas appliance sales was unveiled at the recent eastern natural regional gas sales conference at the Hotel William Penn in Pittsburgh. The meeting was held under the sponsorship of the AGA residential gas section.

J. Theodore Wolfe, of Consolidated Gas Electric Light & Power Co., Baltimore, and chairman of the GID committee, reviewed the background of post-war industry sales that initiated the program and reported on some of the steps taken to date. He reported that Jan. 1, 1956 has been set as a target date to incorporate automatic ignition of all burners as an approval requirement.

The result of surveys conducted in several of the 10 action demonstration cities were briefly reviewed by Christy Payne Jr., of the Peoples Natural Gas Co., Pittsburgh, and a member of the GID committee.

Management taking interest in buying and storing

Management is taking greater interest in the growing complexities of buying and storing the goods required to accommodate and operate the vastly expanded $13.3 billion gas industry. Problems inherent in these operations were reviewed by nearly 100 purchasing agents and storekeepers from all parts of the country who met at the third annual AGA national purchasing and stores conference held recently in Atlanta.

Increased volumes of gas industry purchases have necessitated larger staffs, whose selection and training were discussed by John C. Sims, Brooklyn Union.

General buyers versus specialized buyers was a three-part panel on advanced purchasing personnel. General buyers were favored by V. C. Parkes, El Paso Natural, who liked the general approach for its diversity, particularly in programs for new construction and maintenance of existing operating facilities.

"We are *all* buyers," stated G. F. Olsen, Long Island Lighting. Although he felt that specialization facilitated acquiring items

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A SIMPLE SOLUTION for one of the GAS INDUSTRY'S *most trying problems*

Solves Your Joint Repair Problems • Quick • Easy • Permanent

Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

Norton-McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of
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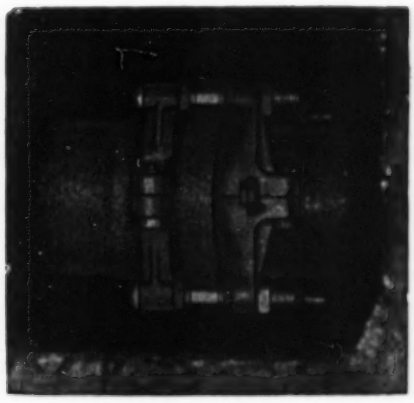
6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

NORTON-McMURRAY MFG. CO.
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Method and product covered by U. S. Patents, Nos. 2,163,261 and 2,178,286.

more efficiently, he observed that size of company and its purchasing department should determine if and how many specialized buyers and general buyers are needed. Between both viewpoints came H. G. Lawrence, Southern Counties Gas, who felt that general buyers efficiently process a variety and volume of purchasing orders, whereas the specialist is best posted on specific products and market conditions.

A prepared list of Do's and Don'ts in storeroom design was presented by P. T. Hughes, SoCounties, which included need for studies to prove need and justify expenditure, inform management of needs and gain clearance, develop general plan and estimate final cost for managements.

At the head table were (l to r): E. F. Hawkesworth, SoCal; Robert I. Highgate, Memphis Light Gas & Water Div.; and Pat H. Butler Jr., Washington Gas Light. The latter two are, respectively, vice chairman and chairman of the purchasing and stores committee.

Rather than "hunch and habit," the scientific doctrine of "when and how much" in ordering goods was covered by R. H. Bussard, Washington Gas Light, who outlined both the method and application of when to purchase supplies to prevent shortages without overstocking, and reordering quantities to effect economical purchasing and stores.

In realizing that procuring, purchasing, storing, and issuing materials adds no value to these materials, but adds to their costs, a report has been issued to help cut such costs.

Looking at stores through an accountant's eye, A. H. Cannon, Transcontinental Gas Pipe Line, equated his stores operations as "inventory plus purchases, less issues, equals inventory."

Rounding out the conference was a discussion of current problems besetting purchasing and stores personnel, whose queries were answered by a veteran in the field, Carl H. zur Nieden, Philadelphia Electric.

AGA launches program of new PR activities

The American Gas Association has launched a program of new public relations activities to assist gas companies locally and to improve the atmosphere for the gas industry nationally.

Supervision will be exercised by the AGA public information committee, with Willis M. Kimball, director of information, The Columbia Gas System Inc., chairman. Remick McDowell, vice president, The Peoples Gas Light & Coke Co., has been appointed chairman of a public relations coordinating subcommittee to work with Independent Natural Gas Association of America, Gas Appliance Manufacturers Association, Liquefied Petroleum Gas Association, and other gas industry organizations.

Three new major public relations activities and a number of lesser activities are be-

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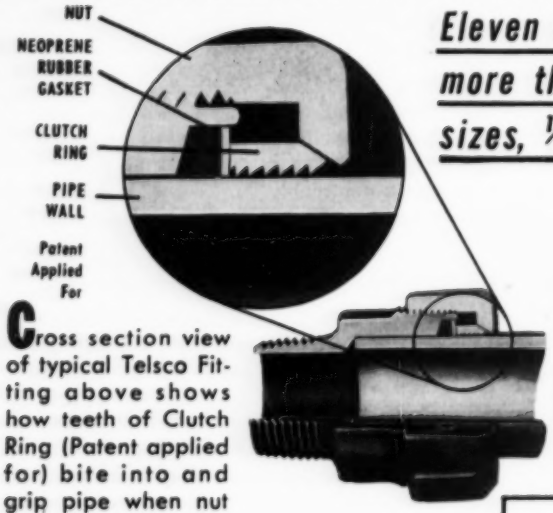

Cross section view of typical Telsco Fitting above shows how teeth of Clutch Ring (Patent applied for) bite into and grip pipe when nut is drawn up. The Neoprene Rubber Gasket, under pressure from the Clutch Ring on one end and the fitting body on the other, completely seals the connection against gas leaks.

Telsco Fittings are tested to hold at traction forces ranging from 1,450 to 3,600 lbs. They hold at hydrostatic forces ranging from 450 p.s.i. (on 2" pipe) to 8,250 p.s.i. (on ½" pipe)

Eleven different types, more than 100 different sizes, ½" through 2"

Metal Stiffeners

Telsco Brass Stiffeners to stop Thermoplastic "cold flow" are available to use with Telsco Fittings on Plastic Pipe. Stiffeners are split to allow for off-diameter pipe, and flared on one end to allow free flow through the connection.

Available in

Couplings (Long and Short), Adapters, 90° Elbows, Tees, Fitting Reducers and Fitting Increasers.

Literature

Complete information about Telsco Fittings: Ask for your copy of *Price List C*, just off the press.

TELSCO FITTINGS DIVISION
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ing inaugurated by AGA this year. First of these is a series of regional public relations workshops to stimulate greater local utility action. Company representatives will be encouraged to "let their hair down" at these sessions and work out methods of meeting their individual public relations problems. Initial workshop in the series will be held in Boston this month (June 16) under joint sponsorship of New England Gas Association, AGA, INGAA and GAMA. Additional workshops are under consideration for September and November. It is planned that each session will be held in cooperation with regional gas associations in the area concerned, as well as with INGAA and GAMA. AGA also is making arrangements for the appearance of public relations speakers at national and regional gas industry conferences and conventions.

Special AGA public relations bulletins to member companies will provide an exchange of material, successful ideas and techniques. Entitled "Intercom" (intercommunication), these bulletins will appear periodically beginning early in May.

AGA also plans to expand its current flow of gas industry information to local companies, including publicity releases, facts, photographs and background material. These will assist local companies in developing their relations with the public, customers, communities, investors, government and labor.

Specific steps are now being taken to coordinate present and new AGA projects with the public relations programs of GAMA, INGAA, LPGA, and regional gas associations. Current and authorized AGA projects specifically directed toward improved public relations total about $150,000 this year.

SGA makes plans for ambitious year ahead

The Southern Gas Association took time during its 46th annual convention in Houston on April 26-28 to look back upon one of its most progressive years and to lay ambitious plans for the year ahead.

In the words of Retiring President H. K. Griffin, the association has, during the past year, "expanded its scope of service to include new fields of activities of assistance to its member companies, enlarged some of its older activities and developed a closer and more effective relationship with the American Gas Association." Statistics to validate the statements of President Griffin were given by Robert R. Suttle, the association's managing director, in his annual report to the convention.

One of these activities, the first of its kind to be undertaken by the SGA, is the work of the pulsation research committee sponsored by the association's transmission section in conjunction with the Southwest Research Institute in San Antonio. The purpose of the project is to investigate the pulsation produced in the gas by the operation of reciprocating type compressors along gas pipelines. As one of the most important transmission operating problems, pulsation results in a loss of power and numerous other mechanical problems due to vibration. (For further information on this development refer to Pipeline Section of this issue.)

New officers and directors of the SGA are (standing, l to r): H. V. McConkey, Southern Union, treasurer; Earl J. Newlin, State Fuel Supply, secretary; J. A. Wilson, United Gas, director; S. V. O'Lenic, Chattanooga Gas, director; H. C. Webb, Oklahoma Natural, director; L. H. Ernest, Caloric Stove Corp., director. Front row: K. H. Turner, Atlanta Gas Light, assistant secretary; J. H. Collins Sr., NOPSI, 1st vice president; C. I. Wall, Pioneer Natural, president; R. A. Puryear Jr., Alabama Gas, 2nd vice president; Hansell Hillyer, South Atlantic Gas, chairman of advisory council. Elected to the board but not available for photograph were W. K. Sanders, Trunkline Gas, and E. C. Cunningham, Texas Eastern Transmission.

Evidence of a rising interest in sales promotion, among distribution companies and on the part of the association, was indicated throughout the meeting. In a vigorous presentation on the opening day of the convention, Christy Payne Jr., Peoples Natural Gas Co., Pittsburgh, reported on the present status of the Gas Industry Development program's action demonstration project.

The servicing of gas appliances as it relates to sales and the promotion of gas service in general was taken up at several of the sales sessions. The details of appliance service were discussed separately at distribution sessions. An attractive dramatization of sales ideas was presented at one of the sales sessions.

The part that the Southern Gas Associatios is playing in the promotion of gas sales throughout its area of activity was indicated by the announcement of a sales promotion bulletin that has been devised by the sales section of the association. The bulletin, to be published periodically and distributed to all member companies, will contain condensed descriptions of successful sales promotion programs developed by individual companies.

A new activity to be undertaken by the association this year on an experimental basis is a management development course designed to train individuals to become better managers by giving them a broader understanding of the fundamentals of management in the gas industry. The course will be tailored to meet the demands of the gas industry and will be directed by a corps of instructors gathered from throughout the south.

New president of the association is C. I. Wall, Pioneer Natural Gas Co., Lubbock Texas. J. H. Collins Sr., New Orleans (La.) Public Service Inc., becomes first vice president and R. A. Puryear Jr., Alabama Gas Corp., Birmingham, was elected second vice president. Other changes in the association's official family included the election of Hansell Hillyer, South Atlantic Gas Co., as chairman and E. C. Cunningham, Texas Eastern Transmission Co., as vice chairman of the advisory council.

It was announced that the 1955 convention will be held in New Orleans on May 16-18.

More than 1000 persons attend measurement course

More than 1000 persons from 36 states, Mexico and Canada attended the 29th annual Southwestern Gas Measurement Short Course held at the University of Oklahoma recently.

Representatives from the oil and gas industries, from executives to meter readers, and other persons interested in the measurement and regulation of gas were in attendance, according to W. H. Carson, Dean of the College of Engineering and chairman of the executive committee for the short course.

Ninety-one classes were conducted, some on a panel basis.

Pat H. Miller, of Texas Eastern Transmission Corp., chairman of the general committee of the course, presided during the opening session. On the last day of the course, Mr. Miller turned over the chairmanship to K. R. Tibbets, of Warren Petroleum Corp.

Newly appointed chairmen of the subcommittee are: R. O. Cox, Lone Star Gas, program; R. F. Nowlin, United Gas Corp., publications; G. H. Schmitt Jr., New Orleans Public Service, practical methods; R. B. Fleske, Cities Service Gas Co., exhibits; Miss Kate A. Niblack, Oklahoma Utilities As-

sociation, registration and publicity; W. H. Carson, University of Oklahoma, local arrangements.

Success predicted if utilities get out and sell

The gas utility companies can capture the reluctant consumer dollars with their quality fuel and superior service—if they will get out and sell. This was the theme of the Midwest regional sales conference in Chicago as it was introduced by Arnold G. Bur, Wisconsin Public Service, who served as chairman.

An innovation was brought to the conference in the form of a panel on gas house-heating, with representatives from utilities, heating engineers, manufacturers, contractors, and distributors participating.

A demonstration of the advantages of automatic gas water heaters was offered by Stanley Gorman, AGA promotional field representative, and Nathan Manilow, National Home Builders Association, told the story of the great potential market for gas appliances in new homes that were either being enlarged or renovated.

Elmer W. Cone, in recounting the dramatic advances made by gas incineration, said there were five manufacturers in 1952, 10 in 1953, and at present 31 manufacturers are producing or subsidizing production of gas incinerators.

The inroads into the domestic cooking market being made by electric ranges was the subject of an informal panel, which frankly discussed weaknesses in the gas range sales picture and contradicted some of the claims made by manufacturers of electric appliances.

Business decline tapering, utility accountants told

On the basis of weekly indices for March and early April it was possible to argue that the steady decline in business operating rates had begun to taper off and that business was in a position of stability rather than the decline that had been effect, delegates to the recent utility accountants workshop in Boston were told by Martin R. Gainsbrugh, chief economist of the National Industrial Conference Board.

He added that recent surveys of anticipated consumer spending for durables and homes, and anticipated outlays for business for plant and equipment, suggest continued declines in these important final markets during 1954, and this suggests a good case for caution for the remainder of the year.

Beach H. McMillen, Cincinnati Gas & Electric, with the aid of slide films, presented the course in customer relations just completed by a committee representing both industries. Dr. Kenneth McFarland, General Motors, emphasized the importance of human relations in industry.

NEWS

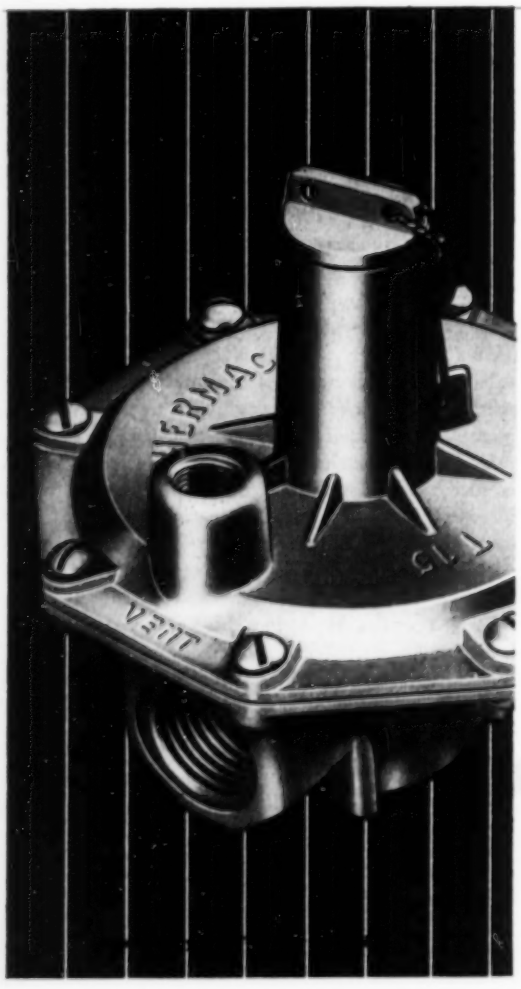
Northern Illinois to add 27,000 heating customers

Letters have been mailed to approximately 27,000 customers of Northern Illinois Gas Co., Chicago, authorizing them to install gas furnaces under the terms of the Illinois Commerce Commission's gas restriction order. The 27,000 who will receive authorization head the company's gas heat waiting list.

The company, recent successor to the Public Service Co.'s gas division, said the additional authorizations at this time were made possible by cancellations from previous allocations coupled with a small amount of additional gas, which the company received from expansion in pipeline flow capacity.

Range shipments down 18.1% in first quarter

While shipments of domestic gas ranges for the month of March are estimated at 177,800 units, 14.6% greater than February, for the year shipments are down 18.1% from the first quarter of 1953. For the first quarter of 1954, 461,400 ranges were shipped. In the first two months of this year, 241,700 electric ranges were shipped compared to 283,600 gas ranges.



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GAS APPLIANCE REGULATORS

SMALL SIZE — LARGER CAPACITY is the chief reason for the unprecedented demand for Thermac pressure regulators.

EASY TO SERVICE. Few rugged parts easily accessible without removing regulator from line.

DEPENDABLE, CONSISTENT PERFORMANCE. Constant pressure regulation eliminates pilot light failures due to fluctuating pressures and assures proper operation of automatic controls.

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NATIONALLY ACCEPTED by all utility companies for servicing. Standard equipment with many leading gas appliance manufacturers.

$$$ LOW COST. High production methods represent a saving of great importance to the appliance builder and user.

THERMAC
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THERMAC GAS SHUT-OFF VALVE—Aluminum Alloy
This high capacity, low restriction manual main gas shut-off valve, when used with Thermac regulators, provides an unusually low cost assembly.

First quarter shipments of gas-fired central heating equipment showed a 2.3% gain over the first quarter of 1953. The 1954 figure is estimated at 135,500 units. In March, gas-fired furnace shipments were 13.3% greater than last March, gas-fired boiler shipments decreased 14.3% and conversion burner shipments were 30.1% below March 1953.

Water heater shipments were down for the first quarter also, with 528,300 units compared to 575,500 last year. For the month of March shipments were estimated at 188,900 heaters compared with 203,000 last March.

Construction of new system launched by Seattle Gas

In anticipation of a favorable announcement by the Federal Power Commission this summer, Seattle (Wash.) Gas Co. has started construction on the first leg of its natural gas supply system, according to N. Henry Gellert, president.

Consisting of 12,000 ft of schedule 30, welded and wrapped steel pipe, the line will serve a residential and light industrial area in northwest Seattle. Prior to the introduction of natural gas into the system, the main will be supplied with manufactured gas from the company's high pressure distribution system.

Automatic features to be stressed in 1954 Round-Up

Advance portfolios containing promotion materials are being distributed for use by utilities and dealers as the preliminary step in this year's Old Stove Round-Up, which will range from late summer through autumn.

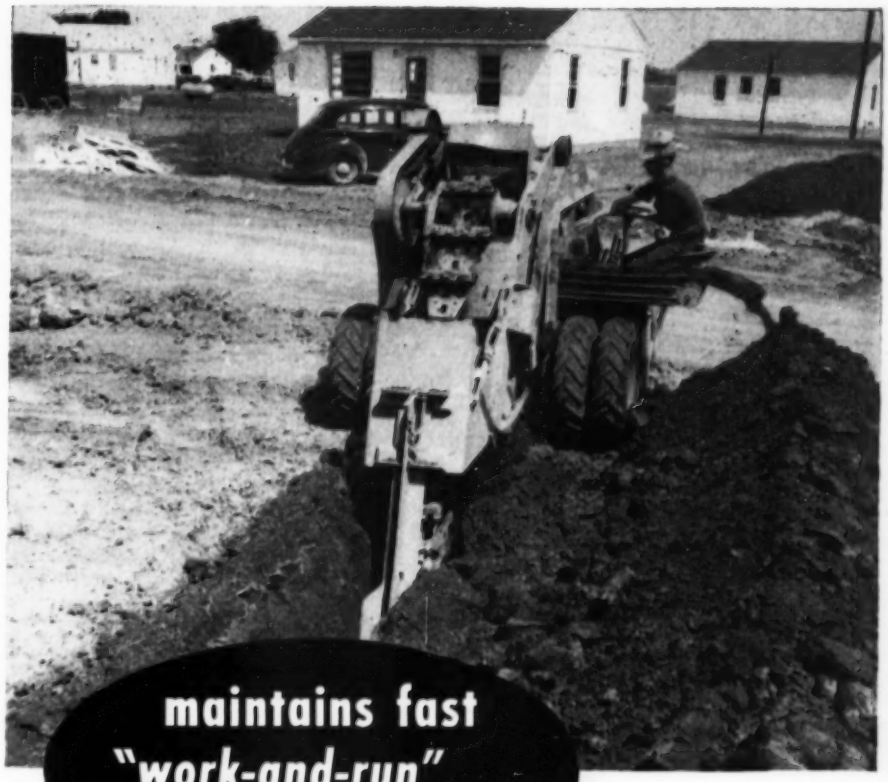
This year, the PAR-backed promotion stresses automatic features of modern gas ranges, although the old-fashioned western cowboy theme still can be utilized at the option of local merchandise managers.

An advertising campaign in the gas trade and general retailing and dealer publications will be conducted by GAMA, which also makes available copies of "Quickie Demos" to help teach drama and salesmanship in selling gas ranges.

Curb sought on utility sale of air conditioners

The refrigeration and air conditioning division of the Associated Mechanical Contractors of Arkansas has filed a petition with the Arkansas PSC asking that the Arkansas Louisiana Gas Co., Little Rock, be prohibited from selling and installing air conditioning appliances.

The petition, which is unique in the records of the commission, charges the gas company with subsidizing its non-public



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- ☐ 12.6 mph mobility on rubber
- ☐ automotive steering
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- ☐ digs up to 14½ ft. per min.
- ☐ 8 to 16 in. wide, 5 ft. deep
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- ☐ shiftable, reversible conveyor
- ☐ 43.6 h.p. gas engine
- ☐ 6-ft. backfill blade (optional)

Parsons rubber-tired 88 Trenchmobile is the low-cost answer on widely-scattered, small-yardage trenching jobs, where it costs more to move big equipment in and out than it does to move the dirt. This mobile trencher drives cross-town at 12.6 m.p.h. . . . digs house-to-street service connections at speeds up to 14½ feet per minute... drives on to next job without delay.

With its 8 to 16-inch cutting widths, and maximum depths of 5 feet, Trenchmobile is also big enough for main line excavations. It saves a lot of costly hand clean-up, too . . . undercuts sidewalks, curbs, gutters, mains . . . makes vertical set-ins flush with foundations . . . backfills its own trench (blade optional). Get the complete story from your Parsons distributor, or write us.

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PARSONS (Koehring Subsidiary) Trenchmobile®

utility operations at the rate of $70,000 per year, in "unfair competition" with other private businesses. The company's distribution and sales of cooking and heating stoves, water heaters, floor furnaces, and laundry equipment are not mentioned in the petition. However, the request for cessation of all non-public utility operations could extend to these appliances.

The complaint asserted that "for a number of years (the defendant) has followed a practice of dealing in the retail sale and installation of appliances . . . . In following said practice the defendant bids and contracts in direct competition with private businesses . . . engaged in the sale of appliances . . .

"Complainants assert that the merchandising of fixtures and appliances is properly a non-public utility operation . . . "

Texas establishes course for practicing engineers

The University of Texas, Austin, has established the Institute of Advanced Engineering, a place where progressive practicing engineers can go for a "briefing" on the many new advances in science and engineering that have taken place since they graduated.

Dean W. R. Woolrich of the College of Engineering announced the institute will be conducted by the college in cooperation with the university's division of extension.

Three courses, each lasting three weeks, will be offered this summer. They are advanced experimental stress analysis, June 14-July 2; new developments in communication theory, Aug. 16-Sept. 3; and composition and properties of oil well drilling fluids, Aug. 26-Sept. 15.

Crowning of Mrs. America climaxes AGA promotion

Mrs. Missouri (Mrs. Madison Jennings), an entrant from the Laclede Gas Co., St. Louis, was crowned as Mrs. America at the climax of the first Mrs. America contest under the sponsorship of the American Gas Association and *Better Living* magazine.

The contest finals, held late in April at Ellinor Village, Fla., and in which 50 competed, concluded months of local and state promotions by 46 participating utilities representing 7.5 million gas meters throughout the United States and Canada.

Automatic gas appliances in the contest were supplied by manufacturers who tied in with the national contest. They included: gas ranges, Detroit-Michigan Stove Co., refrigerators, Servel Inc., gas clothes dryers, Caloric Stove Corp.; gas water heaters, John Wood Co.; gas incinerators, Bowser Inc.; and thermostats and controls, Robertshaw-Fulton Controls Co.

Three other gas company entrants received special proficiency trophies. Second runner-up for the grand award was Mrs. June Terrell, who won the state contest conducted by United Fuel Gas Co., Charleston, W. Va. She was also selected by the judges as keeping the neatest home. Mrs. James Baird Riggle (United Gas Corp.) of Roanoke, Va., was distinguished by her accomplished sewing; Mrs. Florida (Mrs. Mickie McDavid), sponsored by Peoples Water & Gas Co., North Miami, received a trophy for meal planning.

Tall, blonde Mrs. Madison Jennings of St. Louis, Mo., won the nationwide "Mrs. America" contest at Ellinor Village, Florida, sponsored by the American Gas Association cooperating with Better Living magazine.

THE NEW M·S·A FIRST AID KIT IS DIFFERENT... BECAUSE OF IMPORTANT LITTLE THINGS LIKE THIS

Open lid serves as shelf when kit is mounted on wall or vehicle
Clear, concise, first aid instructions
Easy-to-keep-clean case
Wall mounting brackets
Dust and moisture proof rubber gasket
Packages extend above case for easy removal
Easy-to-read identifications

Here's a First Aid Kit that gives you the important *extras* in quality and performance. A few of the important case design and construction features which serve your needs better are illustrated above. And that's only part of the New M.S.A. First Aid Kit story. Quality control, and improved first aid materials are other important improvements that add up to the big difference!

So you can be sure of freshness, purity and sterility, every Unit "D" package is stamped with a Quality Control number. This number identifies the "pedigree" clear back through our every operation.

Our modernization program extends to first aid materials. Color keying of labels for antiseptics, burn treatments, and others assure quick identification. Swabs have gauze tips which are less absorbent, assure maximum utilization of antiseptic.

And there's more, lots more. Get the facts today. Write for our bulletin.

MSA SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.

At Your Service: 82 Branch Offices in the United States and Canada

PUAA judges ConEd first for overall advertising

Consolidated Edison Co. of New York took first prize as a Group A company (400,000 or more customers) for its complete advertising program in the annual Better Copy Contest conducted by the Public Utilities Advertising Association, it was announced last month during the group's annual convention.

Oldest ad contest in existence, it attracted more than 2000 entries in 22 classifications this year. The contest is conducted on a group basis: Utilities with 400,000 or more customers are Group A, "medium size" companies are in Group B, and companies with less than 150,000 customers are Group C.

Here are the official first place winners:

All utilities, complete programs: Group A, ConEd; Group B, Texas Power & Light, Dallas; Group C, Hawaiian Electric Co. Ltd., Honolulu.

All utilities, series of three to five newspaper ads on a PR subject: Group A, Philadelphia (Pa.) Electric Co.; Group B, Louisiana Power & Light Co., New Orleans; Group B, Indianapolis (Ind.) Water Co.

All utilities, single newspaper ad on any subject: Group A, Northern States Power Co., Minneapolis; Group B, Houston (Texas) Lighting & Power Co.; Group C, Hawaiian Electric.

All utilities, employee magazines: Group A, ConEd; Group B, United Illuminating Co., New Haven, Conn.; Group C, Hartford (Conn.) Electric Light Co.

All utilities, employee newspapers: Group A, Appalachian Electric Power Co., Roanoke, Va.; Group B, Arkansas Power & Light Co., Little Rock; Group C, Potomac Edison Co., Hagerstown, Md.

All utilities, any series of direct mail pieces: Group A, Consumers Power Co., Jackson, Mich.; Group B, New Orleans (La.) Public Service Inc.; Group C, Hartford Electric Light.

All utilities, any single booklet, pamphlet, etc., distributed to customers: Group A, Public Service Electric & Gas Co., Newark; Group B, Kansas City (Mo.) Power & Light Co.; Group C, Newport (R. I.) Gas Light Co.

All utilities, printed material used in dealer promotion on any subject: Group A, Detroit (Mich.) Edison Co.; Group B, Southwestern Public Service Co., Amarillo, Texas; Group C, Portland (Ore.) Gas & Coke Co.

All utilities, special employee literature other than house organs: Group A, Florida Power & Light Co., Miami; Group B, Connecticut Light & Power Co., Hartford; Group C, Blackstone Valley Gas & Electric Co., Pawtuckett, R. I.

All utilities, window display: Group A, Northern Indiana Public Service Co., Hammond; Group B, Atlanta (Ga.) Gas Light Co.; Group C, Minnesota Power & Light Co., Duluth.

All utilities, interior displays: Group A,

Sherman Power Diggers Make Small Jobs Profitable

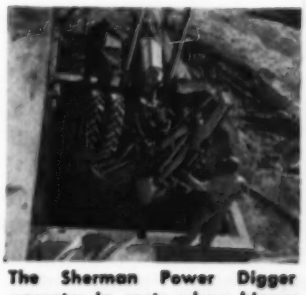
Get all the advantages of power digging, even on smaller jobs where you can't afford to use heavy equipment.

Mounted on a rubber-tired tractor, the Sherman Power Digger makes a compact outfit that gets in and out of tight spots quickly and easily, moves from job to job at top tractor speeds.

It gets digging done in a fraction of the time and cost of manual labor. It digs as deep as 10′ below grade in mud, hardpan, gravel, shale or stony ground. Wide arc of swing allows ample reach for piling or loading. Instant fingertip control harnesses forces up to 10,000 pounds at shovel teeth.

The Sherman Power Digger is low in initial cost, economical to operate and maintain . . . often pays for itself on the first job. Write today for free descriptive bulletin No. 51JR

Heavy, sticky "gumbo" mud presents no problem for the Sherman Digger.



The Sherman Power Digger operates in spots where bigger machines can't.

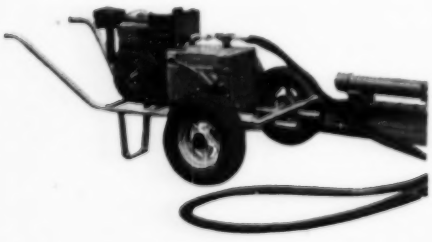
Designed, Engineered and Manufactured Jointly by
SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan
WAIN-ROY CORPORATION
Hubbardston, Mass.

Patent No. 2,303,852
Other patents pending
© SHERMAN PRODUCTS INC., 1954

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN

"Pipe installation time and labor costs cut about 50% with Greenlee Pipe Pusher"

That's what a leading eastern utility reports as its experience with a GREENLEE Pipe Pusher on jobs as shown above. Let this remarkable tool make big timesavings and reduce job costs for you, too. With the GREENLEE Pusher, *one* man pushes pipe *under* streets, walks, floors, railways, lawns, etc. Eliminates extensive trenching and time-consuming tearing up, tunneling, backfilling, repaving. Often pays for itself on the first few jobs. Two models: No. 790 for pushing ¾" to 4" pipe; No. 795 for larger pipe and concrete ducts.



POWER PUMP for all models of GREENLEE Pipe Pushers. Makes the toughest pushing jobs simple, fast for *one man*. Average pushing performance: two feet per minute. Write today for complete details on timesaving GREENLEE Hydraulic Pipe Pushers.

TOOLS FOR CRAFTSMEN
GREENLEE

GREENLEE TOOL CO., Division of GREENLEE BROS. & CO.
1946 Columbia Ave., Rockford, Illinois

Cincinnati (Ohio) Gas & Electric Co.; Group B, Shawinigan Water & Power Co., Montreal, Canada; Group C, Indianapolis (Ind.) Water Co.

All utilities, car and bus cards and truck posters: Group A, ConEd; Group B, Milwaukee (Wis.) Gas Light Co.; Group C, Hartford (Conn.) Gas Co.

All utilities, outdoor advertising: Group A, East Ohio Gas Co., Cleveland; Group B, West Penn Power Co., Pittsburgh; Group C, Mystic Valley (Conn.) Gas Co.

All utilities, annual reports: Group A, Public Service Electric & Gas; Group B, Dayton (Ohio) Power & Light Co.; Group C, Portland Gas & Coke.

All utilities, radio advertising (all companies compete as one group): Ohio Fuel Gas Co., Columbus.

All utilities, motion pictures (competing as one group): Philadelphia Electric.

All utilities, television (competing as one group): Peoples Gas Light & Coke Co., Chicago.

Gas companies, single newspaper ad promoting use of gas: Group A, ConEd; Group B, Laclede Gas Co., St. Louis; Group C, Indiana Gas & Water Co., Indianapolis.

Gas companies, single newspaper ad selling gas merchandise: Group A, Public Service Co. of Northern Illinois, Chicago; Group B, Southern Union Gas Co., Dallas; Group C, Portland Gas & Coke Co.

Ohio heating restrictions virtually eliminated

For the first time in several years, the public utilities commission of Ohio has lifted practically all controls over gas space heating. The commission said its 15th supplemental emergency order means most Ohioans would be able to install gas heating plants for next winter—provided they file written applications and provided they live in areas already served.

Although the commission authorized most companies to clean up their backlogs of requests and to fill new requests on a comparatively unlimited basis, it did leave full controls temporarily in effect in the Newark and Defiance areas with the hope that additional supplies might be obtained during the summer. Relatively minor controls were left on the use of gas for heating commercial and industrial establishments.

AGA labs complete south-wing addition

Modern executive and clerical offices together with industry committee meeting rooms were recently completed and placed in use by the American Gas Association Laboratories at Cleveland, Ohio. They are located on the second floor of the south wing addition erected during 1952.

Two new committee rooms have been provided for use by the approval requirements committee, its subcommittees, gas research groups and other industry activities. The smaller room can conveniently handle a group up to 12 persons while the larger room will accommodate 60.

While the main committee room houses the Laboratories library collection of bound periodicals, transactions and proceedings volumes, the Laboratories reference collection of records, reports and books are retained in the library office adjoining this committee room. A folding partition is used to separate the library office from the committee room during meetings.

The completed building features a 2200-sq ft general-purpose central assembly area for larger group meetings and luncheon space as well as employee social activities.

Two all-gas kitchens are on display in the central assembly area. The larger all-gas kitchen displays a fully automatic gas range, which is changed periodically, and a gas refrigerator. The smaller kitchen contains a top burner section, a gas refrigerator, and an automatic dishwasher. They are available for use by equipment manufacturers needing a modern all-gas kitchen background for advertising and publicity purposes.

Built-in wall cabinets with shelving, located in the administrative offices, form the inner wall of the corridor, which encircles the central assembly area.

Main industry committee meeting room capable of accommodating groups of 60 or less. Large conference table seats 20. Adjoining is library office where Laboratories reports, historical records, and reference books are kept.

Each office and meeting area is equipped with acoustical ceilings, and is fully air-conditioned.

Further expansion of existing Laboratories facilities at Cleveland is under way with the erection of a 17,800-sq ft north wing addition. This will provide needed expansion of the appliance and accessory testing services. Construction is expected to be completed during 1954.

NGE announces completion of Wilgus consolidation

Final consolidation of Wilgus Manufacturing Co. into an operating manufacturing division and wholly owned subsidiary of Natural Gas Equipment Inc., Pasadena, Calif., has been completed. Wilgus manufactures gas and oil regulators.

Almost 60,000 sq ft of floor space is now occupied by NGE in its new and larger quarters to accommodate Wilgus machinery and the increased number of workers required by the design, manufacture, assembly, and sale of the line of NGE gas burners and industrial furnaces.

The following personnel and job functions in connection with the Wilgus consolidation were announced:

L. P. Stoker becomes manager of manufacturing, assisted by John McCargar and Carl Jennings; J. C. McCluskey continues as manager of NGE's commercial sales; R. E. Graper, vice president, continues as manager of industrial sales; J. D. Wilgus remains as treasurer of the subsidiary; S. K. Weiser becomes supervisor of valve sales; M. G. Lowe becomes supervisor of heating and air conditioning sales.

Natural gas stocks reflect general optimism

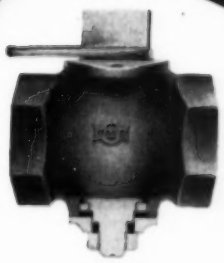
The general optimism prevailing in the securities market was reflected in the price index of natural gas company stocks for the month of April.

According to the AGA report, the composite price of 30 natural gas company common stocks on April 30, 1954 was approximately 11.1% higher than a year earlier. Coupled with this increase in price, dividend payments advanced only 4.2%, resulting in a relative decline of 6.1% for yields on these stocks when the current period is compared to the similar period one year earlier.

The price of 10 gas transmission company stocks increased 7.7% over the comparable period of last year, while the price of the 10 gas distribution company stocks increased 20%. Accompanying these price changes were increased dividends of 1.2 and 9.4% for the transmission and distribution components. Because of the larger relative increases in prices than in dividend payments of these common stocks, yields declined 5.0 and 7.9% for transmission and distribution companies, respectively.

IT PAYS TO BUY HAYS that are TOPS

7405
Iron Body, Galvanized, Bronze Plug Stop



7490
"Key-Lok" Tamper Proof Stop Lockwing—Iron Body, Bronze Plug

7500
Threadless Gas Stop Iron Body, Brass Plug

Service Line Stops—Meter Stops
Appliance Stops

Tamper Proof and Standard Patterns

Iron Body with Brass Plug
Black or Galvanized
Also All Brass Stops

Flat Head—Flat Head with Lockwing

Full Range of Sizes

Quality Assured . . .
By Precision Machining—
Individual Testing—
Rigid Inspection

Quality Proven . . .
By Supplying the Gas Industry for Over 80 Years

Standard Packaging for Easy Handling, Space Saving Storage . . . Another HAYS First

Write for literature, or ask "The Man from Hays"

GAS SERVICE PRODUCTS
HAYS MANUFACTURING CO.
ERIE, PA.

Fourteen-year low marked in 1953 accident rate

The lowest accident frequency rate in the past 14 years was chalked up last year by the gas utility industry in the United States, according to a report issued by the American Gas Association. The report, entitled "Employee Accident Experience of the Gas Industry: 1953," contains data from 405 gas utilities and pipeline companies representing about 90% of the industry's employees.

For the sixth successive year the frequency rate has declined. In 1953 the gas industry had 12.92 disabling injuries per million man-hours of exposure, a rate that was 10.3% lower than in 1952.

Last year the industry's severity rate of 0.87 days charged to disabling injuries per 1000 hours worker was 7.4% higher than the 1952 rate. Despite higher 1953 severity rates, the industry's severity record was the fourth lowest since AGA began compiling such statistics in 1929.

Indicative of growing interest in motor vehicle accidents, comprehensive statistics in the report show the frequency of automotive accidents per 100,000 miles traveled by gas utility motor vehicles. Companies reporting such accident data, representing 59% of total industry employees, showed 1.60 accidents per 100,000 miles traveled—a decrease of 13.0% over the 1952 rate.

HALFWAY AROUND THE WORLD...

with CARBOSEAL Trade-Mark ANTI-LEAK

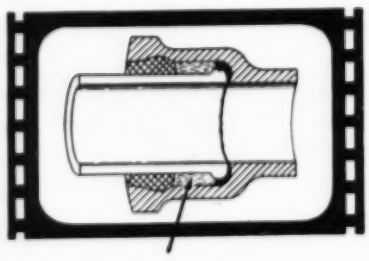
Distributors of dry gas have bought enough CARBOSEAL anti-leak to leak-proof 13,000 miles of 3-inch equivalent main. And the first bell-and-spigot joints treated with CARBOSEAL anti-leak—20 years ago—are still tight.

CARBOSEAL anti-leak is effective and lasting when unaccounted-for gas increases after changing over to a dry gas. It swells the fiber packing in a bell-and-spigot joint as much as 44 per cent of its dry volume. This swollen condition lasts, because CARBOSEAL anti-leak doesn't evaporate to any extent.

CARBOSEAL anti-leak is easy and economical to apply. You don't have to uncover every joint—just pour the anti-leak into graded mains at the high points, or spray as much as 300 feet of main from one opening with a hose and nozzle.

The cost of enough CARBOSEAL anti-leak to treat 1 mile of 3-inch equivalent main is about $100!

Get all the facts—write for our booklet, Form 4506.



SEE AND HEAR

. . . the whole story. Write today for our free 16 mm. color-sound movie that shows how two gas companies used CARBOSEAL *anti-leak.*

CARBOSEAL ANTI-LEAK

Carbide and Carbon Chemicals Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada:
Union Carbide Canada Limited, Toronto

"Carboseal" is a registered trade-mark of Union Carbide and Carbon Corporation.

News Notes

According to present plans of Consolidated Edison Co. of New York, all of its gas customers will be served with natural gas by the fall of 1958. The plans, however, are subject to approval by the New York PSC. Natural gas is now being supplied to a total of 340,000 customers in the company's Westchester county territory, certain areas in the Bronx, and a small area in upper Manhattan and in Queens.

A bill which would have compelled Rhode Island utilities to pay 45% of the cost of operating the state public utilities division has been vetoed by Governor Roberts, who originally advocated it. He said the bill had been amended against his wishes to strip the director of the state department of business regulation of any control over public utilities and placed full regulatory powers in an administrator within the executive department.

Finding that the Long Island Lighting Co.'s natural gas business yields a return of less than 4% on the value of property used in gas service, the New York Public Service Commission holds that there is no basis for a reduction in the company's rates. The commission had allowed increases several years ago when it found that the company was selling gas at a loss. Since then, the rate of return has ranged from about 3% to 5%, in 1953 it was 3.94%. Last year the company lowered gas rates by about $200,000 a year and increased wages.

A bill has been defeated in Rhode Island that would have prohibited any public utility in the state from owning stock in any other public utility with which it does business, and prohibited interlocking directorships between these two utilities. Another bill that failed would have exempted consumers' public utility bills from the state sales tax.

Montana Attorney General Olsen has appealed to the State Supreme Court from a lower court judgment that the state attorney general, acting on behalf of the state, has no authority to represent the interest of the public in an appeal from a rate order of the state public service commission. Olsen has been unsuccessful in his efforts in the lower courts to block gas and telephone rate increases approved by the PSC.

Forty-eight high school home economics students were recent guests of United Natural Gas Co., Oil City Pa., during the company's fourth annual all-day gas-country tour. The tour was designed to demonstrate to the students how natural gas is produced and transmitted to customers homes. Highlights of the trip were visits at a drilling well, a compressor station, a

field warehouse, a transmission line junction, and a communications center.

Niagara Mohawk Power Corp., Syracuse, has received PSC sanction for the construction of a gas plant and the excercise of a gas franchise in Camillus, Onondaga county, N. Y. The new distribution system will cost about $140,000.

Ebasco Services Inc., New York, has opened a Dallas office in the Southland Life building. The company already has offices in Chicago and Washington, D. C., in addition to its New York headquarters. The Dallas office will be managed by W. A. Buchanan.

Rheem Manufacturing Co. is adding glass-lined models to its present lines of copper tank and galvanized steel water heaters. Facilities for glass lining water heaters will be added to three plants: Baltimore, Chicago, and Los Angeles.

Two manufacturers of gas-fired appliances have been honored for their advertising by the fifth annual Associated Business Publications contest. Servel Inc., Evansville, Ind., received first place honors for its two-page, black and white ad, prepared by Hicks & Greist Inc., which launched the automatic ice-maker refrigerator and which was designated as "the most effective use of advertising to dealers and distributors." Caloric Stove Corp. received first-place honors in the multiple-page classification for its four-page color insert in Electrical Merchandising exploiting Caloric's color campaign in *Time Magazine*.

Offices of the National Council for L. P. Gas Promotion and the L. P. Gas Information Service were moved last month from 11 S. LaSalle St., Chicago, to 185 N. Wabash Ave. in the same city. Additional space has been provided for storage, mailing, and mimeographing facilities required by the expanding promotional program.

PUC approval has been received for the transfer from Southern California Gas Co. to Southern Counties Gas Co. of the distribution facilities used to serve approximately 185 customers in an area recently annexed to Culver City (Calif.).

Two volume-building uses of L. P. Gas—homeheating and carburetion—will be featured in the 12th round of ads to be released by the L. P. Gas Information Service in the June, July, August, or September issues of 56 leading magazines. The ads will reach a total of 122 million readers.

•

New Servel distributors appointed recently include: B. Segall Co., Shreveport, La.; Serv-Well Air Conditioning Supply Co., Parma, Ohio; Wilkins Co., Little Rock, Ark.; B. J. Lee Co., Memphis, Tenn.; L. J. McAllister Co., Boston; and Tel-Electric Co., Spokane, Wash.

Stones, rocks, boulders . . .

A Tough Combination to Beat

IN CORTLAND, N. Y. this gas extension job was dug in ground studded with stones, rocks and boulders, as the picture shows. This "Baby Digger" with Cleveland's exclusive wide range of digging wheel and crawler speed combinations took the difficult digging job in stride.

This famous Cleveland transmission combination gives the operator finger tip control of more than 30 usable combinations of digging wheel and crawler speeds. Digging in conditions such as this—or in mud, clay or sand—is always done with the most effective combination of power and speed because this Cleveland feature makes the *right* combination instantaneously available.

Cleveland "Baby Diggers" hustle safely from job to job . . . at legal limit speeds . . . because they are so easily portable on compact Cleveland Trailers.

Write for descriptive bulletins and specifications, or get the full story on CLEVELANDS from your local distributor

THE CLEVELAND TRENCHER CO.

"Pioneer of the Modern Trencher"

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

CALENDAR

June

1-3..Edison Electric Institute Annual Meeting — Atlantic City, N. J.

2-3..PCGA Building Design & Maintenance Conference — La Jolla, Calif.

2-3..AGA Research & Utilization Conference — Hotel Statler, Cleveland.

2-4..Gas Technology Short Course. Texas College of Arts & Industries, Kingsville, Texas.

5..California Natural Gasoline Association Annual June Frolic—Rio Hondo Golf Club, Downey, Calif.

7-11..Practicing Law Institute & AGA Symposium on Current Legal Problems of the Gas Industry— New York.

7-9..Institute of Cooling & Heating Appliance Manufacturers—Netherland Plaza, Cincinnati.

13-18..American Society for Testing Materials Anuual Meeting and Exhibit — Sherman Hotel, Chicago.

20-24..Canadian Gas Assn.—Banff Springs Hotel, Banff, Alberta.

21-22..AGA Residential Gas Section, New York-New Jersey Regional Gas Sales Conference — Monmouth Hotel, Spring Lake, N. J.

27-29..Wisconsin Utilities Association Accounting Section — Dell View Hotel, Lake Delton, Wis.

28-29..Michigan Gas Assn.—Grand Hotel, Mackinac Island, Mich.

July

6-9..American Home Economics Association—San Francisco.

August

23-25..Appalachian Gas Measurement Short Course — West Virginia University, Morgantown, W. Va.

September

8-10..31st Mid-West Gas School and Conference, Iowa State College — Hotel Sheldon-Munn, Ames, Iowa.

8-10..Pacific Coast Gas Assn. — Vancouver, British Columbia.

10..New Jersey Gas Association —Hotel Monmouth, Spring Lake, N. J.

13-14..Independent Natural Gas Association of America Annual Meeting — Roosevelt Hotel, New Orleans.

17-18..Maryland Utilities Assn., Fall Conference — Virginia Beach, Va.

28-29..Texas Mid-Continent Oil & Gas Assn. — Baker Hotel, Dallas.

October

7-8..California Natural Gasoline Assn. Annual Fall Meeting. Ambassador Hotel, Los Angeles.

10-13..Controllers Institute of America — Edgewater Beach Hotel, Chicago.

11-13..AGA Annual Convention — Atlantic City, N. J.

18-22..National Safety Council — Chicago.

27..NEGA Operating Division — Hotel Statler, Hartford, Conn.

November

1-5..National Metal Exposition— Chicago, Ill.

8-11..American Petroleum Institute—Conrad Hilton Hotel, Chicago.

15-17..American Standards Association—Hotel Roosevelt, New York.

17..NEGA Safety Conference — Hotel Statler, Boston.

17-19..Southeastern Gas Association —Sir Walter Hotel, Raleigh, N. C.

17-19..Wisconsin Utilities Association, Electric & Gas Section, Technical & Sales & Service Divisions — Hotel Schroeder, Milwaukee.

28-3..American Society of Mechanical Engineers — Statler Hotel, New York.

December

7..NEGA Appliance Servicing Conference — Hotel Statler, Boston.

1955

January

18..NEGA Operating Division— Hotel Statler, Boston.

March

7-9..Mid-West Gas Association— St. Paul Hotel, St. Paul, Minn.

7-11..National Association of Corrosion Engineers — Palmer House, Chicago.

People

Promotions

BERNARD E. GALLAGHER has been named assistant to H. R. Searing, president of Consolidated Edison Co. of New York. He succeeds EDWARD E. HILL, who has retired.

BETTY WHITLOCK has been named advertising and publicity supervisor for Southern Union Gas Co., Dallas. She joined Southern Union's advertising staff in March 1953 as a copywriter.

Recent Milwaukee Gas Specialty Co. appointments include DONALD R. WEIDENFELLER as manager of home office sales; EDWARD O. ABEL, manager of production service division; ROY R. RAFENSTEIN, district manager of the western division, Long Beach, Calif.; and LEONARD W. BOWERMAN, district manager of the eastern division with offices in Milwaukee.

RALPH W. DUVAL, rate attorney of Pacific Gas & Electric Co., San Francisco, has retired from that position and FREDERICK T. SEARLS has succeeded him. Mr. DuVal will become special attorney for the company.

RALPH T. MCELVENNY, president, has been elected chief executive and administrative officer of the American Natural Gas Co., New York, succeeding the late William G. Woolfolk.

JAMES A. WILSON, superintendent of Texas distribution operations for United Gas Corp., has been elected vice president and operating manager of the Texas distribution properties, succeeding the late Harry P. Carroll.

General American Transportation Corp., Chicago, has elected SAM LAUD, who has been president since 1945, vice chairman of the board, a new position. WILLIAM J. STEBLER, formerly executive vice president, becomes president. Other new officers include HERMAN ALTSCHUL, vice president in charge of freight car sales; JAMES S. FREY, director and vice president in charge of manufacturing; FRANK E. SELZ, vice

W. J. Stebler

Sam Laud

General American

president in charge of the platform division; and SPENCER D. MOSELEY, assistant to the president.

Iowa-Illinois Gas & Electric Co., Davenport, Iowa, has made the following changes in its executive organization: C. P. CONRAD, from president to chairman of the company and continues as its chief executive officer; C. P. WHITMORE, former vice president and general counsel, becomes president; R. H. TINSMAN, former secretary and treasurer, is a vice president and will continue as treasurer; W. M. HUEBSCH is secretary; H. A. KLEINMAN, formerly manager of electric production, is vice president; C. J. MATCH, former manager of the gas department, is assistant vice president; G. A. UHLMEYER and J. M. HOLLINGSWORTH are also new assistant vice presidents. Other promotions include W. H. WEISE, manager electric production department; R. M. HETHERINGTON, manager gas department; W. B. WATERMAN, general counsel.

B. M. STUBBLEFIELD, for the last seven years manager of Chicago district operations for the Youngstown Sheet & Tube Co., retired last month. He will continue with the company on a consulting basis. ARCH J. COCHRANE succeeds him in the Chicago post.

GEORGE R. HAYS has been elected financial vice president of Laclede Gas Co., St. Louis, succeeding L. C. PETERS, who has resigned.

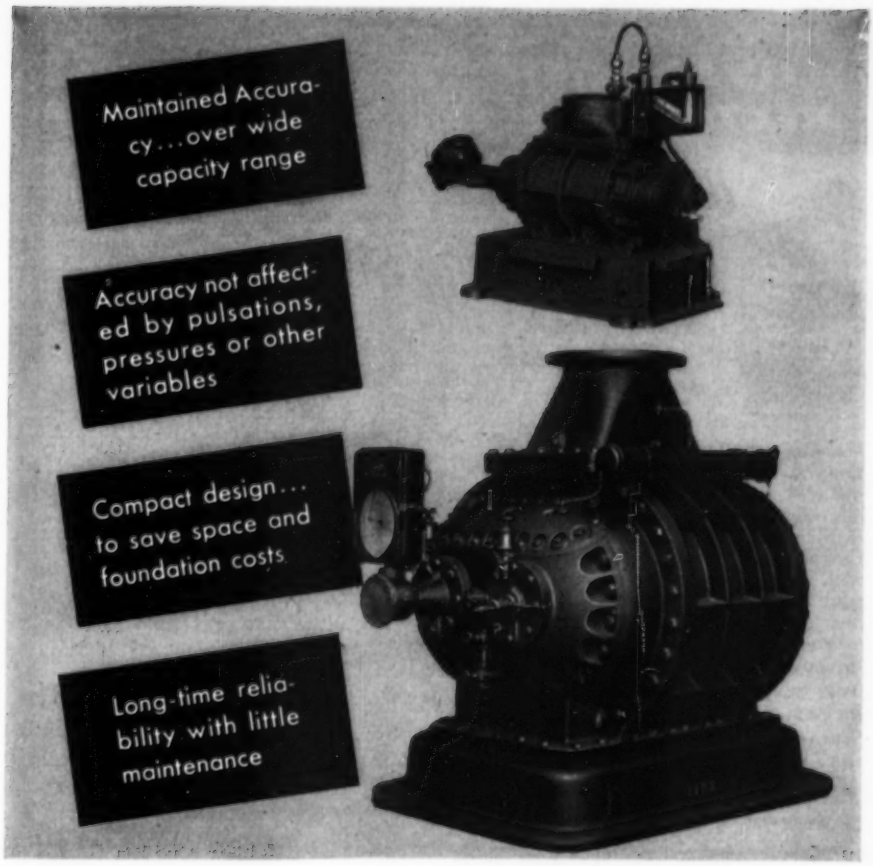
Ebasco Services Inc., New York, has promoted JOHN J. REILLY to the post of chief appraisal engineer, succeeding W. M. BLACK, who has become consulting appraisal engineer. ROBERT EASTERLY has been asigned to the company's Chicago office to represent the company in connection with new business development.

Consolidation of all engineering activities of Peoples Natural Gas Co., Pittsburgh, into a single general engineering department has resulted in the appointment of HOWARD M. JOINER to the newly created post of chief engineer. Mr. Joiner, formerly assistant superintendent of distribution and chief mechanical engineer, will have A. F. KRAUS and WILLIAM F. SPENCER as chief engi-

A. I. Ingham

H. M. Joiner

Peoples Natural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Long-time reliability with little maintenance

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COMPANY_____

NAME_____ POSITION_____

STREET CITY ZONE STATE

neers. ALBERT I. INGHAM, formerly chief geologist, has been appointed to the newly created position of superintendent of land and geology.

Whirlpool Corp., St. Joseph, Mich., has appointed WILLIAM D. FOWLER as administrator of industrial and public relations. Assisting him are GLENN D. CLARK, director of management development; LESLIE V. FRENCH, director of training; and A. S. HATCH, director of public relations. Other appointments include: JOHN PLATTS, works manager; HOWARD LIFFICK, director of industrial relations; M. R. DENISON, director of purchasing. OTTO KRAUSS has been named general manager of the St. Joseph division.

C. C. Eeles

D. E. Young

Ohio Fuel Gas

DAVID E. YOUNG, assistant manager of industrial and commercial sales for Ohio Fuel Gas Co., Columbus, has been promoted to assistant district manager of the firm's Toledo district. Replacing him in Columbus will be CHARLES C. EELES, Toledo district industrial and commercial sales manager. The company also announces that, as a result of the promotion of KENNETH M. BAKER to the information department of the Columbia Gas System in New York, EDWIN L. MCCOY has become news bureau manager of Ohio Fuel.

WILLIAM L. MONROE has been promoted to the post of assistant to the sales manager of the Dresser Manufacturing Div., Bradford, Pa. He was formerly manager of the distribution section of customer service.

Lone Star Gas Co., Dallas, has elected L. A. BICKEL assistant general manager of the Dallas division of distribution, and E. L. HARPOLD supervisor of stores. Mr. Harpold succeeds C. F. WILSON, who has retired. A. L. WILLIAMS assumes the duties of assistant supervisor of stores.

F. WARREN COOPER, comptroller, has been elected vice president and comptroller of Public Service Electric & Gas Co., Newark.

Reorganization in the distribution operations of the Peoples Natural Gas Co., Pittsburgh, has resulted in the following appointments: COLIN U. MILLER and ROY K. MCDANIEL, manager and supervisor of sales

for the eastern division, respectively; GEORGE W. BRISBIN manager and WARREN E. HAUGHT supervisor of sales of northern division; WALTER LOWE, supervisor of sales, central division; RALPH W. POWELL, manager, and RUSSELL A. HALL, supervisor of sales, southern division; GEORGE K. KLINE, manager, and C. W. CULLEN, supervisor of sales, western division. JOSEPH S. MCAVOY is local manager and RONALD WILSON is office manager at Johnstown; and HAROLD E. GREENE is local manager and WILLIAM J. THOMPSON is office manager at Altoona.

ROBERT M. DREVS has been elected secretary of the Peoples Gas Light & Coke Co., Chicago, succeeding REMICK MCDOWELL, who will remain as vice president and retain general direction of the offices of the secretary and treasurer and of financial and public relations functions of the company. WILLIAM H.HOLLWEG succeeds Mr. Drevs as assistant secretary and assistant treasurer; WILLIAM E. SAUER is budget director; and THOMAS L. MALZACHER is assistant budget director.

Following the retirement of A. W. PETERSON as vice president of Central Vermont Public Service Corp. and manager of the company's northwestern division in St. Albans, Vt., the company has named MAYNARD P. FOSTER commercial manager of the northwestern division and SEYMOUR H. ROBINSON operating engineer for the area.

F. H. Donnell
CEC

Lynn Maxwell
Black & Co.

FRANKLIN H. DONNELL has been named vice president in charge of finance of Consolidated Engineering Corp., Pasadena, Calif. Mr. Donnell has served the company as a director and chairman of the finance committee of the board of directors since 1945.

New faces

LYNN MAXWELL has joined the sales engineering staff of Malcolm W. Black & Co., New York, where he will specialize particularly on the regulator equipment of the Fisher Governor Co., Marshalltown, Iowa. For the past four years he has been gas engineer for the New Jersey Natural Gas Co.

W. J. MCCLURE has joined Davey Compressor Co. as northwestern district mana-

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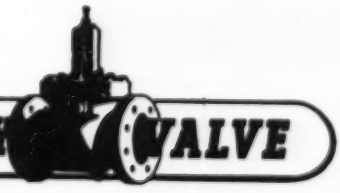

SECURITY VALVE CORP.
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ger. With headquarters in Seattle, Wash., he will be in charge of Davey's compressor and air tool sales in the Pacific Northwest.

H. W. MILNER has joined Ruud Manufacturing Co. as executive sales assistant, a newly created position. Mr. Milner was formerly manager of Affiliated Appliances, a division of Affiliated Gas Equipment Inc.

GEORGE V. DUTNEY has joined Nordberg Manufacturing Co., Milwaukee, as special assistant to the president.

MICHAEL J. KRAEMER has joined Commonwealth Services Inc., New York, as general consultant specializing in financial studies, security analyses, and budgetary projections and forecasts.

LAVERNA BEST has joined the Houston (Texas) Natural Gas System as home service director, succeeding MRS. WINNELL SIMMONS, who has resigned. Miss Best was formerly with Oklahoma Natural Gas Co., Tulsa.

Deaths

G. T. VAN ALSTYNE, 62, director of advertising and publicity for Air Reduction Co. Inc., died late in April at his home in Plainfield, N. J. Mr. Van Alstyne joined Airco's advertising department in 1919.

WILLIAM G. WOOLFOLK, retired president and board chairman of Michigan Consolidated Gas Co., died recently while vacationing in Tucson, Ariz. He was 77 years old. Mr. Woolfolk also was a former board chairman of the American Natural Gas Co. and of the Michigan-Wisconsin Pipe Line Co.

H. P. CARROLL, vice president and operating manager of the Texas distribution division of United Gas Corp., died recently after an illness of several months. Mr. Carroll began his career in the gas industry in 1911 when he went to work as a map maker for the old Beaumont Gas Light Co. Since 1930 he had been an executive with United Gas and predecessor companies.

HAROLD J. REEKIE, vice president and general manager of United Cities Utilities Co., Chicago, died suddenly late in April. He was 41 years old. He joined United Cities in 1936 as district manager of the Central Wisconsin Gas Co.

CHARLES R. CRANE II, vice president and director of Crane Co., Chicago, died suddenly on May 8. He was 61 years of age. A grandson of the founder of Crane Co., Mr. Crane had been associated with the Company for 46 years. He held such positions as assistant to the vice president in charge of manufacturing, assistant vice president of sales, vice president of sales, and vice president in charge of European operations.

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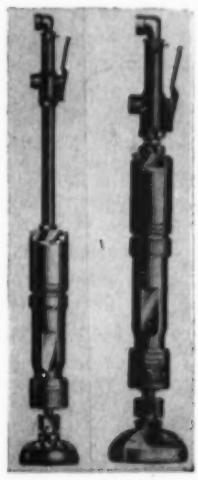
New Products and Trade Literature

To secure further information on products or new literature, simply fill out the coupon on page 92 and mail, indicating by number the information or literature needed.

1 Backfill Tampers



Two new backfill tampers have been introduced by Davey Compressor.

Model DT-32 is in the medium weight class and is suitable for construction work. The DT-42 was designed to meet requirements of operators for an extra hard-hitting tool. It has more than double the work capacity of medium weight tampers and is reputed to substantially speed up tamping jobs without increasing labor cost.

A special locked type butt, which eliminates the possibility of the butt coming off of the piston during operation, is incorporated. Locking device is located on top of the butt, away from the pounding action.

Both models can be frame-mounted to permit the operation of three tools simultaneously.

Davey Compressor Co.

■

2 Goosenecking Boom

A hydraulically operated goosenecking boom is now available as an optional accessory on the Pitman Crane, Model 80, 4-ton truck crane manufactured by Pitman Manufacturing Co.

Believed to be the first of its type ever

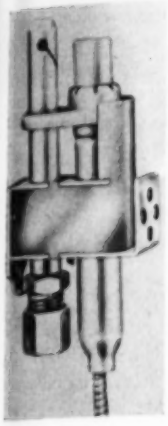
offered commercially, the boom was developed by Pitman as a quick, easy solution to overhead travel clearance problems. The Pitman crane is designed so that a trailer can be pulled by the same truck the crane is mounted on.

With the new gooseneck-type boom, the operator can fold the boom down over a loaded trailer simply by pushing a lever at his regular operating station.

Pitman Manufacturing Co.

■

3 Pilot Burner



General Controls has placed in production "Snorkel" pilot burners and pilot generators that have been designed for above-the-floor heating installations that tend to collect dust and lint. The new heating equipment operates on the principle of drawing primary air under the pilot flame before it is mixed with gas in a cool, sealed chamber. Bringing the air past the flame brings all dust and lint into contact with the flame, incinerating it and leaving the intake air completely clean and free of air-borne particles.

Additional provision against plugging is provided by large diameter pilot and thermopilot flame ports. Primary air is mixed with gas in the chamber to avoid cracking of the gas.

General Controls Co.

■

4 Furnace-Clothes Dryer

A new appliance that is both a gas warm air furnace and a clothes dryer has been introduced by the Herbster Products Co. Called the Herbster Heat-N-Dry, the unit is about the size of an ordinary refrigerator.

The dryer, which is mounted on top of the standard lowboy Herbster warm air furnace, cuts clothes drying time in half, it is

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The Ohio Fuel Gas Co. Columbus, Ohio
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INCORPORATED
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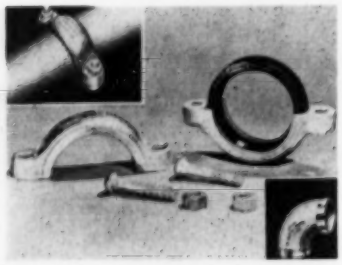
reported. The short drying cycle, combined with the fact that only filtered air touches the clothes, assures safe drying. The dryer door, which shuts off the dryer when opened, is at chest height.

Other features include the elimination of basement moisture, saving in floor space, and fully automatic operation.

Herbster Products Co.

■



5 Coupling and Fitting

Suitable for use wherever extremely light, high-pressure pipe systems are needed, new aluminum Gruvagrip couplings and fittings for grooved aluminum pipe have been announced by Gustin-Bacon Manufacturing Co.

Available in 2-, 4-, 6-, and 8-in. sizes, the new couplings automatically absorb expansion and contraction, shock, ground motion, and vibration. They remain leakproof under end pulls up to 46,000 lb; permit layout misalignment up to 3°; withstand temperatures between 200° F and —65° F. The sealing gasket is of resilient synthetic rubber.

Gustin-Bacon Manufacturing Co.

■

6 Sight-Glass Liquid

Fluorochemical 101, a new liquid for use in sight glasses of force feed lubricators, has been announced by Minnesota Mining & Manufacturing Co. According to the manufacturer, the new fluid has a long useful life and does not become cloudy or leave deposits on the surface of the glass.

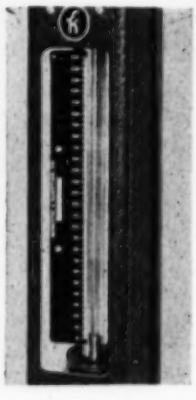
Fluorochemical 101 is completely inert, is colorless, odorless, nonflammable, and has no know effects on the skin or body.

The fluid is available in half-pint, pint, quart, and gallon quantities. An 8-oz. bottle of it will fill 10 lubricators of medium size.

Minnesota Mining & Manufacturing Co.

■

7 Rotameter



Schutte & Koerting's newly designed SK Safeguard Rotameter for rate-of-flow measurement is completely enclosed in a steel meter case with detachable safety glass windows that protect the metering tube from external shock and act as a safeguard in the event of accidental tube breakage. Rigid construction gives the Safeguard precise end fitting alignment, eliminating pipe stresses on the Rotameter tube. Standardized construction permits the use of up to four sizes of meter tubes in one meter case.

Wide front and rear sight windows provide maximum visibility. Scales are available calibrated either in units of flow, or in millimeters for use with calibration charts.

Schutte & Koerting Co.

■

Trade Literature

8 Burner and Sales Catalogs

Harper-Wyman Co. has released two new publications. (When ordering copies, use letter preceding description along with number of this notice.)

(a) A 32-page color catalog includes complete information and specifications for all Harper-Wyman products: Alltrol center simmer burners and valves, oven and broiler valves, clothes dryer valves, space heater valves, filters, orifices, jets, orifice adaptors, automatic lighter parts and related products and supplies.

(b) The company has revised its booklet "How to Sell More Gas Ranges," which describes 12 proven, effective demonstration ideas that help sell gas ranges to consumers. New ideas and techniques have been incorporated in this third edition.

Harper-Wyman Co.

■

9 Valve Assembly Catalog

Catalog A-205 from the Gas Machinery Co. describes a variety of valve assemblies especially designed for the gas plant. In addition to specifications and descriptions of the valve assemblies, the 49-page catalog presents tables on temperature conversion, time-cycle control, weights and measures, physical and thermal properties of gases, and conversion factors, among others.

Gas Machinery Co.

■

10 Control Catalogs

Several catalogs are available from Minneapolis-Honeywell. (When ordering copies, use letter preceding description along with number of this notice.)

(a) Catalog 8203 gives specifications, ordering information, and a price supplement for its complete line of Honeywell industrial control motors and industrialized motorized valves.

(b) Bulletin 9604 describes new miniature flame rod assemblies, Photocell units, pilots and other components used in Honeywell Protectoglo combustion safeguard systems for industrial oil and gas burners.

(c) Bulletin 6430 describes the new Brown dual temperature controller and contains information on application, control forms, and ranges.

Minneapolis-Honeywell Regulator Co.

■

11 Appliance Data Sheets

Caloric Stove Corp. has published appliance data sheets on the Caloric double-duty automatic gas disposer and the automatic built-in gas ranges designed for the AGA reference manual of modern gas service.

Caloric Stove Corp.

■

12 Clamp and Saddle Manual

Clamps and saddles for steel or cast iron pipe are featured in a new catalog and manual from the M. B. Skinner Co. Several completely new products, including the coupling saddle and the wall service fitting, are shown for the first time. A series of installation pictures and captions for each clamp provides instructions for the repair of all types of pipe leaks.

M. B. Skinner Co.

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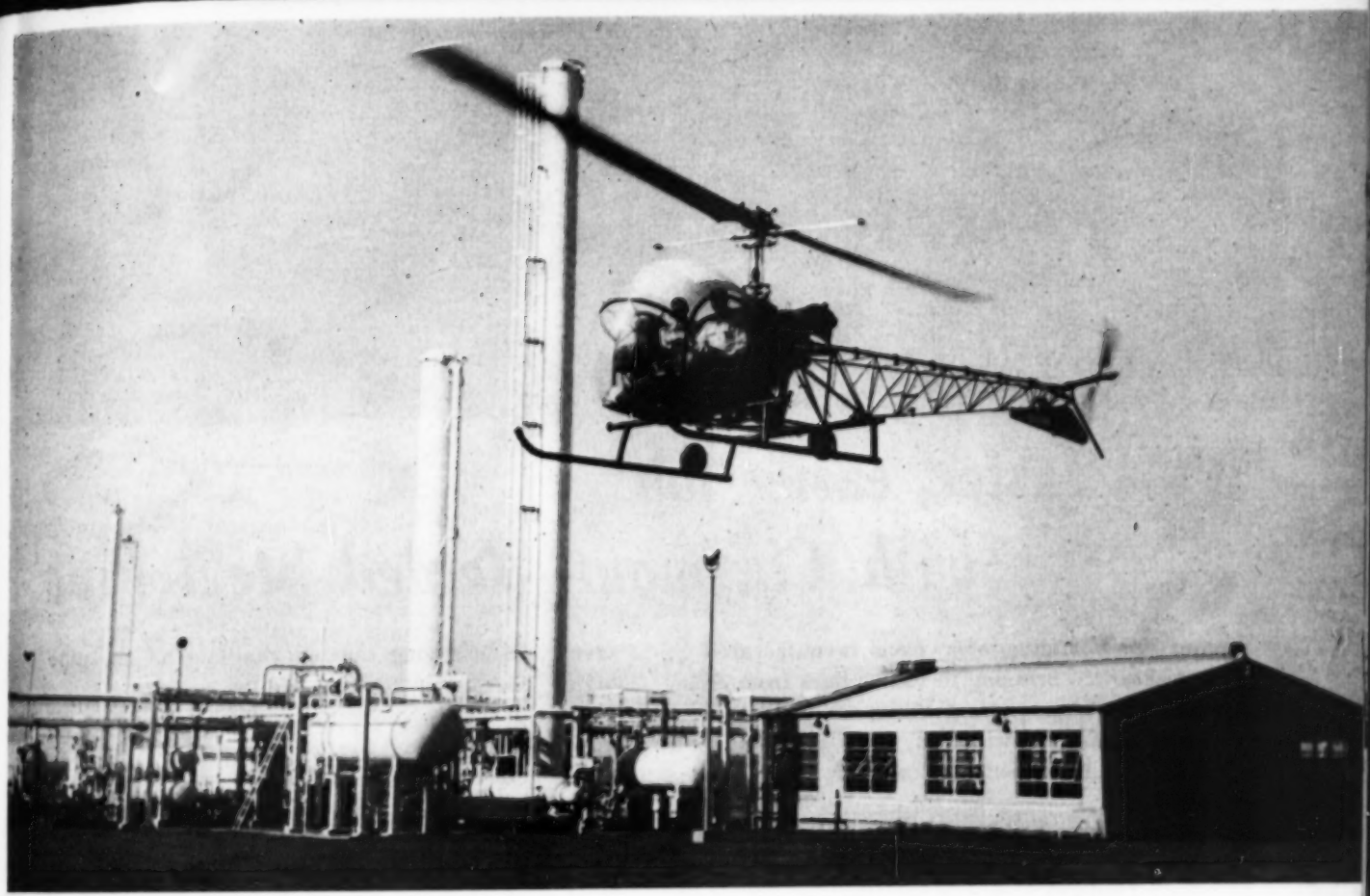
GAS Transmission and Conditioning Section



Helicopter transports chart changers

WHAT is believed to be the first use of a helicopter in field operations by a natural gas transmission company was undertaken last month on an experimental basis by Colorado Interstate Gas Co., Colorado Springs.

The initial use of the helicopter occurred at the Lakin (Kan.) compressor station where the plane will be used to transport chart changers to and from the more than 200 wells utilized there by the company to provide part of the natural gas brought into the Rocky Mountain area.

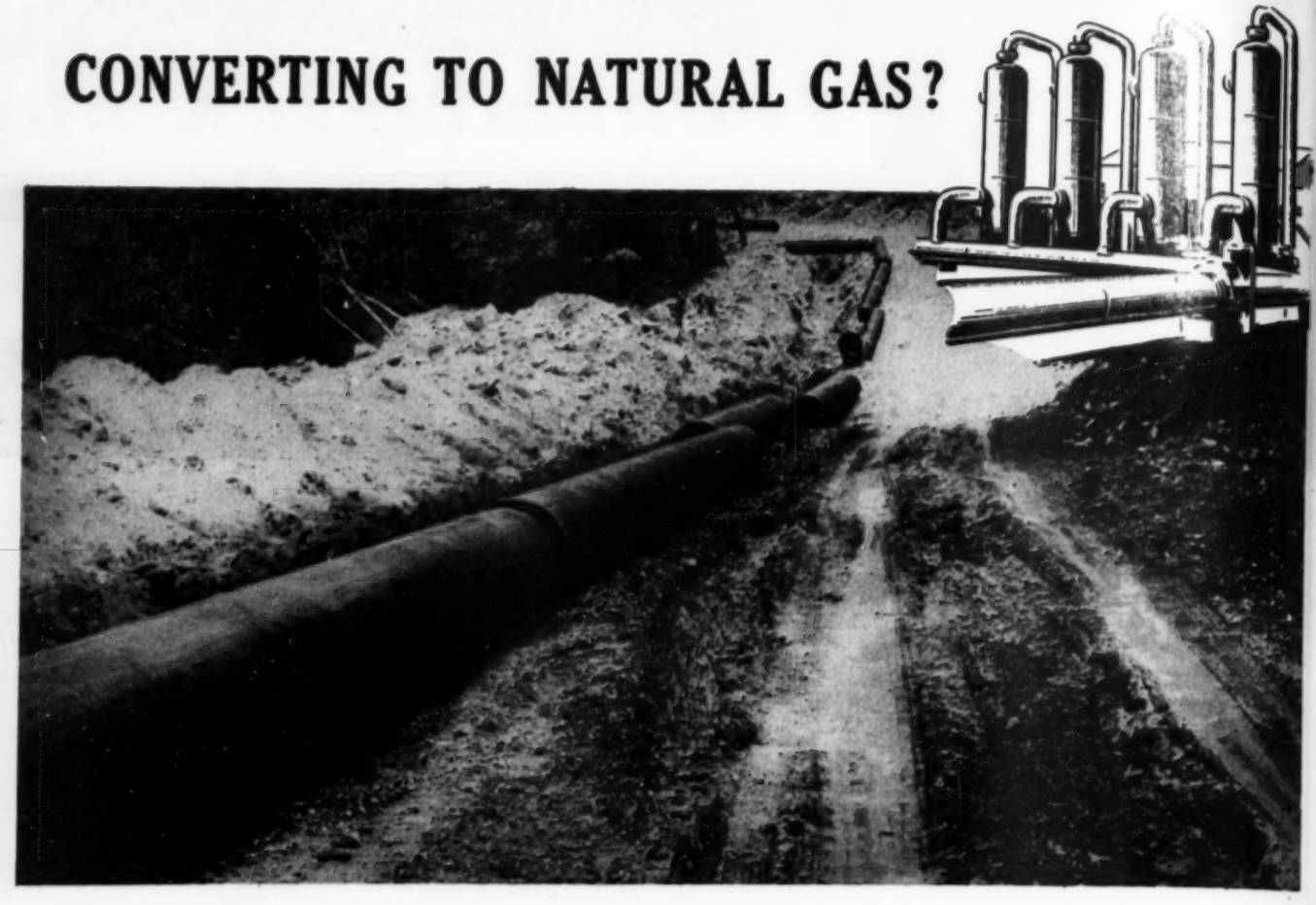
These wells, scattered over a wide area, are in some instances spaced more than a mile apart. It is believed the helicopter will provide quicker and more efficient service in the changing of the charts that record the flow of gas from the wells.

Present plans also call for its use at several other locations in the Oklahoma Panhandle field, another source of natural gas supply for Colorado Interstate.

The initial period of study was for two weeks. At the end of that time, officials of the company planned to review the operations and compare the efficiency of plane use with the old method of transporting chart changers by motor vehicle in the gas supply areas.

Colorado Interstate contracted with Allied Helicopter Co. of Tulsa, Okla., for the initial two-week experiment.

CONVERTING TO NATURAL GAS?



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CLAYMONT STEEL PRODUCTS

Engineers devise new method for attaching pipeline pigtail

By FRANK CHAPMAN • Editor

A. L. Stegner, Tennessee Gas Transmission engineer who developed the pigtail-attaching equipment, uses the chain-driven milling cutter to clean a spot on the top of the pipe where a pigtail is to be attached. The manner in which the aluminum tube is wedged in place can be seen in this picture.

Two Tennessee Gas Transmission Co. engineers, Robert Ransom (left) and Marion Frank, lower the harpoon type pigtail-attaching device into an aluminum tube that is in contact with the buried pipeline.

Dry cell batteries are used to fire the graphite-enclosed furnace at end of harpoon to weld pigtail to buried line. One engineer holds harpoon steady while the other makes connection to batteries.

LONG-SUFFERING corrosion engineers who have often wished for a simple method of making a pigtail connection to an already buried pipeline will be interested in an arrangement that has been devised for this purpose by some of their fellow sufferers at the Tennessee Gas Transmission Corp.

The operation as they have devised it actually makes use of several pieces of equipment which together provide access to the buried line, clean the pipe at the point where the weld is to be made, and weld the wire pigtail to the line. The need for equipment to do this job arises when old lines are put under protection for the first time or when, for one reason or another, it becomes advisable to know the pipe-to-soil current at any one particular point along the line.

Patented design

The specialized equipment that is used to clean the pipe and make the weld has been patented by A. L. Stegner, who has led the design project at Tennessee Gas.

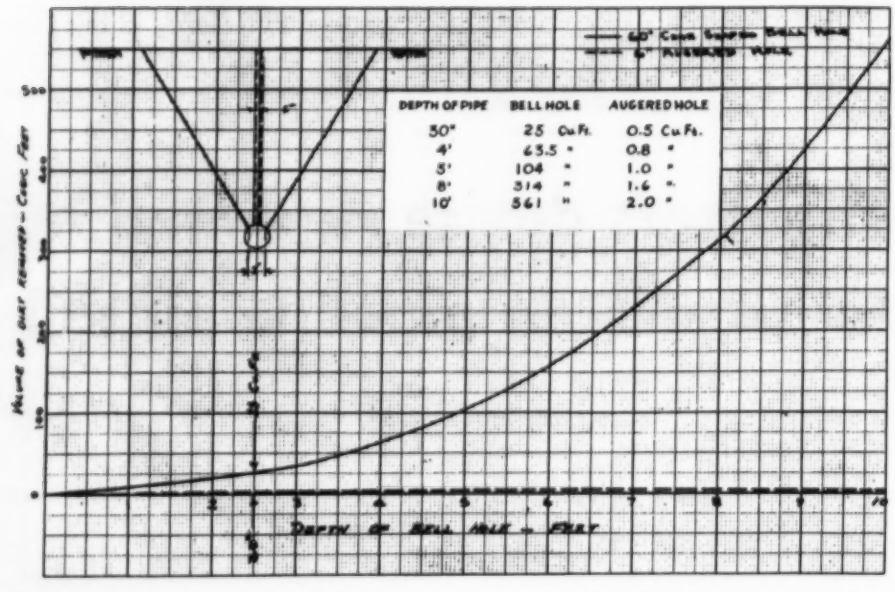
Anyone who has had the job of making a pigtail connection on a buried line will vouch for the fact that the biggest part of the job is digging the bell hole for access to the line. The amount of soil that must be removed increases rapidly with the depth of the line and can become a major excavation job on the deeper lies. The relationship between the pipe depth and the amout of soil that it is necessary to remove in making a bell hole is shown graphically in *Fig. 1.*

Amount of soil

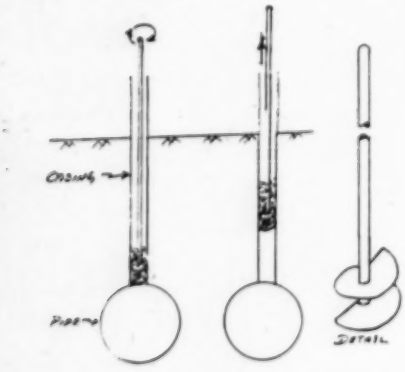
The equipment that has been devised by Tennessee Gas engineers can be used in a 6-in. diameter hole that has been augered from the ground level to the surface of the pipeline. The amount of soil that is removed by this method in reaching lines of various depths is also shown, by means of comparison, on *Fig. 1.* The hole is bored with a standard 6-in. bucket auger.

Casing inserted

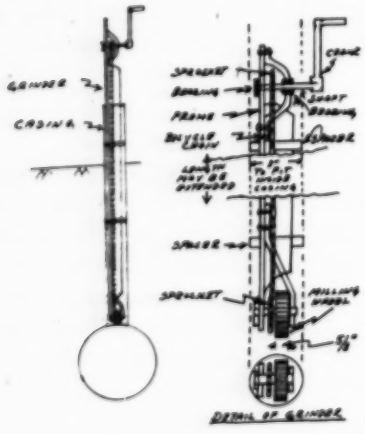
After the hole has been bored to the line, a length of 3-in. ID aluminum casing is inserted so that it rests on the pipe. The total length of the casing is determined by the depth of the line. If desirable, shorter sections may be



Relationship between the pipe depth and the amount of soil that must be removed in making a bell hole (Fig. 1).



Auger made of thin metal with diameter slightly smaller than inside of casing on wooden handle or pipe easily takes out dirt that will be found in hole when casing has been inserted.

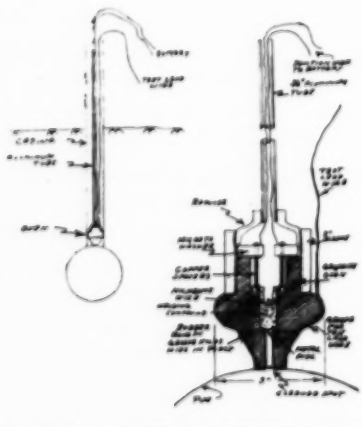


The end grinder with 3-in. diameter spacers is inserted inside casing. The operation of the crank with chain and sprockets rotates the milling wheel, which removes wrapper, coating and rust from pipe. The spot cleansed will be round and 1 in. in diameter if grinder is rotated horizontally. Spot will be in center of 3-in. diameter casing.

threaded for extension. Pieces of lumber are wedged between the casing and the side of the bored hole to steady the casing, and a light-weight auger with a diameter slightly smaller than that of the casing is used to clean the excess dirt out of the casing.

Special equipment

At this point the first of two specially built pieces of equipment is brought into use. After the casing has been cleaned, a crank and chain driven milling cutter mounted on the end of a long, thin support is used to remove wrapper, coating and rust from the surface of the pipe. An ordinary 5/8-in. cutter and sprocket drive are mounted on a shaft and secured to one end of the device. A shaft equipped with a crank and sprocket on the opposite end of the device drives the cutter through a bicycle chain. The overall length of the cleaner will vary with the depths at which it will be used. Spacers sized to fit the inside diameter of the casing are placed so that it is held securely during the cutting operation. The cutter will clean a 1-in. diameter round spot on the top of the pipe.



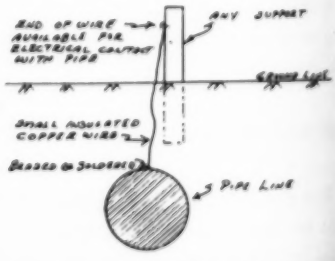
The welding appartus, prepared with test lead wire, ignition wires and heating element, and welding compound with starting powder, is lowered into the casing. Battery heats element, ignites compound.

Welding the pigtail

The second specialized piece of equipment is brought into use at this point to weld the pigtail to the pipe. This device consists of a graphite oven on the end of a ¾-in. aluminum tube. A small cavity in the oven holds a supply of welding compound. The compound is kept from flowing from the cavity through a small hole to the end of the device by a small metal disk. A pair of ignition wires are connected to a short length of nicrome resistance wire embedded in the compound. Grooves in the side of the oven provide a space for the pigtail and hold it in position across the opening in the end of the oven.

Low voltage

To make a weld the pigtail wire is secured to the end of the oven with a rubber band and the device is lofered into the casing to where it rests on the cleaned spot. A low voltage is connected across the ignition wires and the welding compound, which is ignited by the hot nicrome wire, runs down through the hole in the center of the oven and welds the wire to the pipe. The welding device and the casing are then both removed and the hole is backfilled.



Typical test lead used for making electrical contact with buried pipe. It is necessary for taking electrical instrument readings in connection with corrosion control.

Friction factor tests of the Super Inch pipeline

By **JOHN J. PUGH** • Pacific Gas & Electric Co., San Francisco

A SERIES of friction factor tests, conducted over a three-year span, has given the Pacific Gas & Electric Co. valuable data in planning capital additions to its "Super Inch" pipeline, the major carrier which brings gas from the Arizona border to the PG&E service area. The tests cover a period during which deliveries from the line increased from 224 to 644 MMcf per day; and the data obtained from the tests have provided a basis for gauging capital improvements requirements as they would be affected by increases in the friction factor.

Such tests as these show the necessity of maintaining a real awareness of whether the pipeline is continuing to sustain a minimum friction factor.

The Super Inch has undergone several additions since it was first laid. Before December 1951, the 502-mile Topock (Ariz.)-to-Milpitas (Calif.) line had no compressor stations. Gas was received at sufficient pressures to carry right through to Milpitas. In that month, three stations went on the line—Topock, located immediately on the California side of the Colorado river, Hinkley, 159 miles northwest of it, and Kettleman, 195 miles farther north from Hinkley. The pipeline is 34-in. OD, with wall thicknesses, tapered between stations, varying from 7/16 in. to 5/16 in.

As initially powered, installed brake horsepower aggregated 44,820, divided

This article has been adapted from a talk presented at the PCGA transmission conference in San Francisco on May 12.

Fig. 1. Friction factor test of Topock-Hinkley section of 34-in. Topock-to-Milpitas pipeline. Test extended from 10 a.m. to 1 p.m. on May 12, 1953.

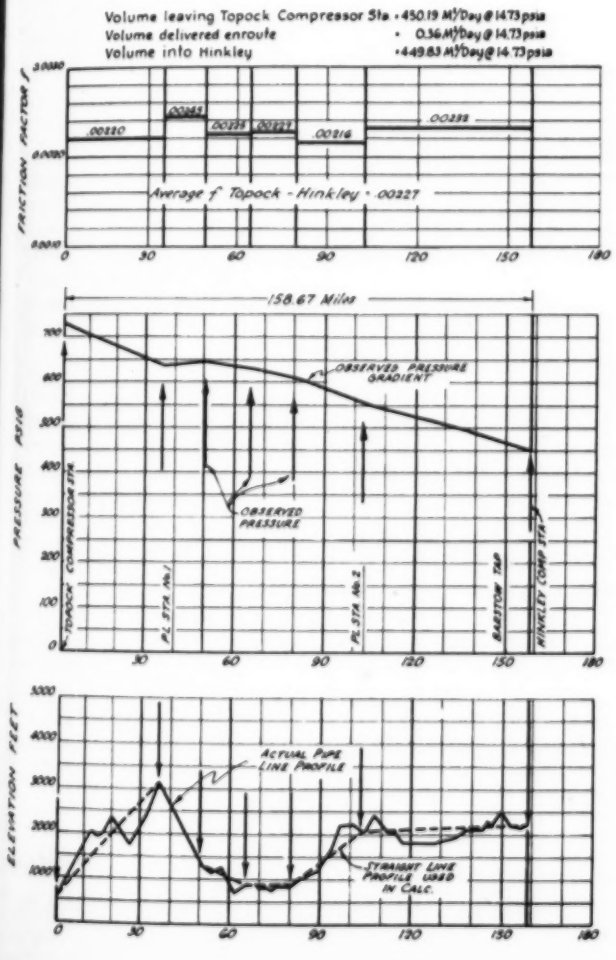
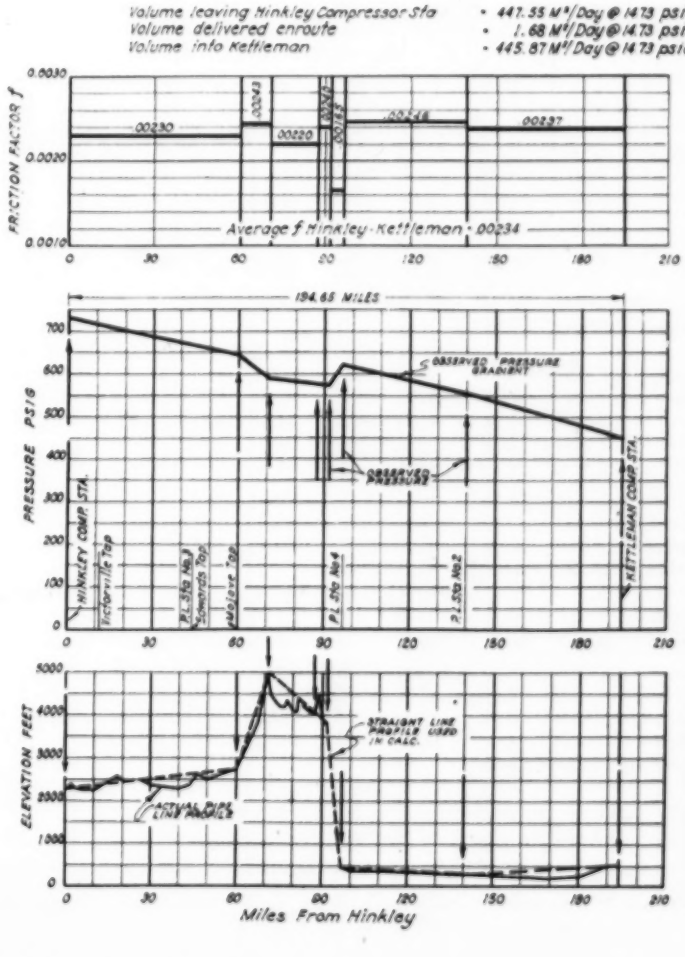


Fig. 2. Friction factor test of Hinkley-Kettleman section of 34-in. Topock-to-Milpitas pipeline. Test extended from 10 a.m. to 12 noon, on May 12, 1953.



	Friction Factor including elevation & deviation adjustment	Friction Factor excluding elevation adjustment		Friction Fac. excluding deviation adjustment	
		f	% change	f	% change
Topock-Hinkley	0.00227	0.00256	+12.8	.00208	- 8.4
Hinkley-Kettleman	0.00234	0.00217	- 8.4	.00209	-10.7
Kettleman-Milpitas	0.00230	0.00227	- 1.3	.00207	-10.0

Table 1. Effects of deviation and elevation on friction factors.

among Topock (15,000 hp), Hinkley (17,500), and Kettleman (12,320). As of February 1954, the total had been increased to 64,360 hp—20,000 at Topock, 25,000 at Hinkley, and 19,360 at Kettleman. There are now nine compressors at Topock, 10 at Hinkley, and 12 at Kettleman.

Installation of loops

Loops have also been added totaling about 133 miles, of which 30.5 miles lie between Topock and Hinkley, 84.5 between Hinkley and Kettleman, and 17.7 between there and Milpitas.

Throughout its length, the line crosses several ranges of hills and mountains. From an elevation of 500 ft at Topock, it reaches a maximum elevation of 5000 ft and a minimum close to sea level; and at one point on the west side of the Tehachapi mountains, the line drops 4200 ft in about 7 miles.

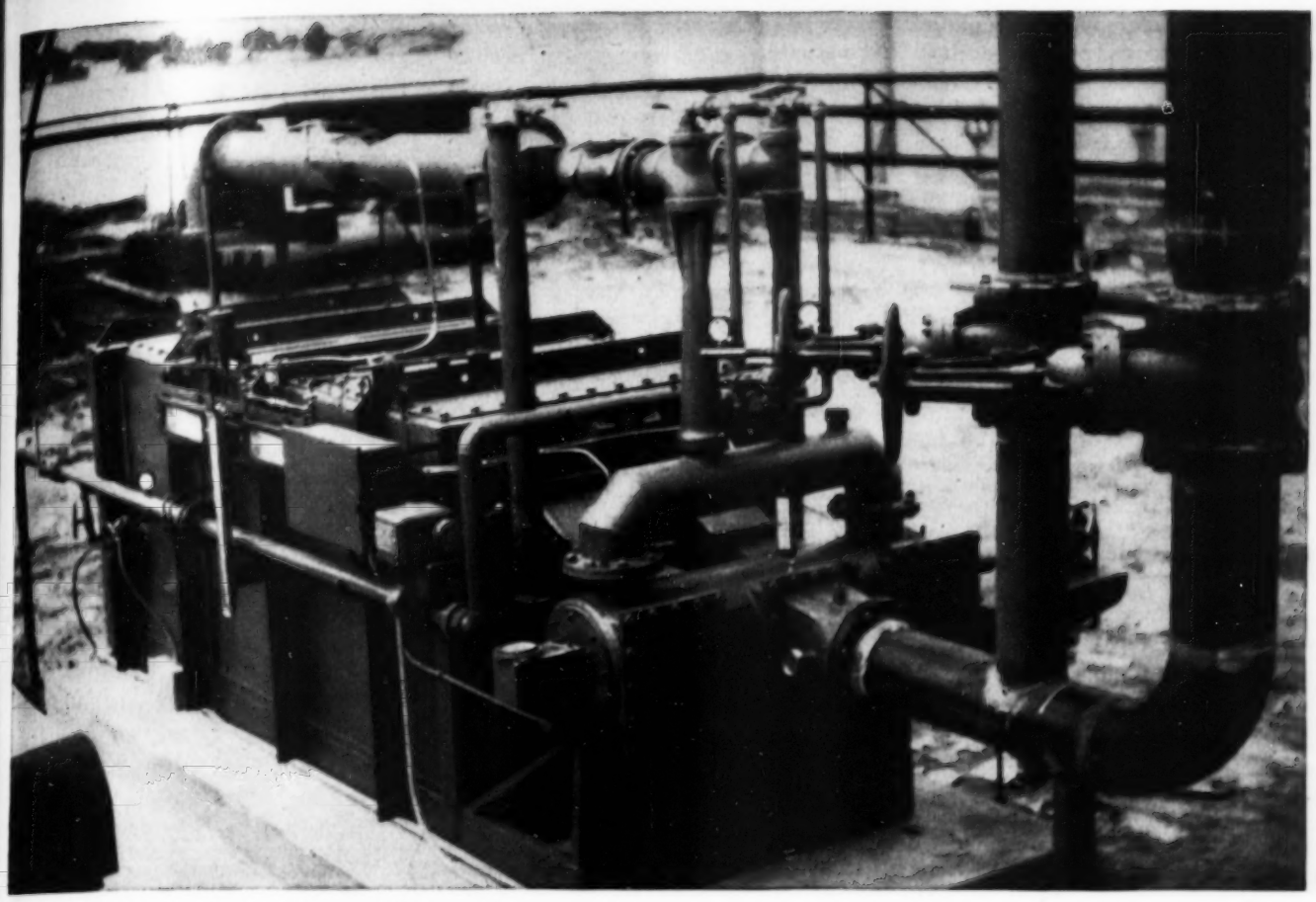
Because of the many ups and downs in the pipeline, it has been necessary to consider the effect of elevation on pipeline flow. This effect must be considered if the results of either design facility or friction factor calculations are to have any value in fact as, under certain flow conditions, a large margin of error will result if this adjustment is not made. The classical hydraulic flow equation $Q^2Lf = K(P_1^2 - P_2^2)$, after being adjusted for the elevation effect, is used herein to calculate the friction factor. The adjustment for elevation involves either the addition or subtraction, depending on whether the flow is downhill or uphill, of the head of fluid effective in a given section of the pipeline to the pressure drop term $(P_1 - P_2)$, for the section.

Line stabilized

When a test run is to be made to evaluate the pipeline friction factor, input and deliveries to the line are stabilized and all variable deliveries from the line are minimized insofar as is possible. By starting this stabilizing procedure some 8 to 10 hours before the time the test is to begin, all tests may be conducted under conditions approximating the ideal of steady flow. While the actual tests generally extend over periods of four to six hours, sometimes it has been necessary to restrict the actual period used to calculate friction factor values to shorter portions of these

										A	B	C			D		E
Pressure Tap Location	Miles from compressor station	Actual Mileage between Press. Taps	Miles of equiv. 36" wall between Taps L	Change in Elevation between Taps up = − down = + h in feet	Upstream Pressure psia P_1	Downstream Pressure psia P_2	Deviation Factor for section Y	Average Gas Temperature °F	Specific Gravity of Gas S	$y(P_1^2 - P_2^2)$	$\frac{y^2 sh}{(P_1+P_2)^2} \times$	Columns A+B		Square Root through Q in Line section between Press. Taps Q = M³/hr @ 14.73 psia	Q^2LK in Thousands		Friction Factor f Calc'd from Diam
			MAY 12, 1953 TEST - TOPOCK-HINKLEY SECTION - VOLUME OUT OF STATION = 450.13 M³/DAY														
Topock	0.00																
	38.97	38.97	36.65	- 2568	743.9	649.1	1.120	94	0.659	+147,903	- 72,371	75,532		18.756	24,351		0.00220
	50.25	14.38	14.46	+ 1821	693.1	667.3	1.115	70	"	- 11,944	+ 44,910	32,966		"	13,451		0.00245
	65.61	15.26	15.26	+ 463	667.3	643.1	1.114	68	"	+ 24,570	+ 11,303	31,873		"	14,142		0.00225
	80.64	15.03	15.03	+ 44	643.1	621.4	1.112	67	"	+ 30,503	+ 1,067	31,580		"	13,893		0.00227
PL No 2	103.09	22.45	22.45	- 1294	621.4	547.3	1.105	66	"	+ 71,061	- 26,231	44,830		"	20,736		0.00246
Hinkley	158.67	55.58	54.69	- 82	547.3	462.5	1.092	64	"	+117,852	- 1,274	116,578		"	50,299		0.00232
Topock - Hinkley		Average f								+ 375,955	- 42,596	333,359			146,872		0.00227
			MAY 12, 1953 TEST - HINKLEY - KETTLEMAN SECTION - VOLUME OUT OF STATION = 487.55 M³/DAY														
Hinkley	0.00																
Mojave	59.37	59.37	60.21	- 845	744.4	655.3	1.128	63	0.655	+140,676	-18,912	124,764		18.615	54,112		0.00230
	70.96	11.59	11.59	- 2225	655.3	600.3	1.115	62	"	+ 77,000	- 51,856	25,144		18.578	10,356		0.00243
	87.80	16.84	16.84	+ 954	600.3	590.0	1.108	62	"	+ 13,584	+ 19,466	33,050		"	15,045		0.00220
	92.36	4.56	4.56	+ 232	590.0	586.0	1.107	62	"	+ 5,207	+ 4,593	9,800		"	4,074		0.00240
PL No 4	97.30	4.94	5.01	+ 3377	586.0	534.5	1.111	62	"	- 65,764	+ 73,150	7,386		"	4,476		0.00165
PL No 5	139.67	42.37	42.02	+ 156	534.5	567.6	1.109	62	"	+ 89,186	+ 3,205	92,391		"	37,542		0.00246
Kettleman	134.65	54.98	53.97	- 291	567.6	462.9	1.092	62	"	+117,820	- 3,263	114,557		"	46,219		0.00237
Hinkley - Kettleman		Average f								+ 377,709	+29,283	406,992		428.57 M³/DAY	173,823		0.00234
			AUGUST 12, 1953 TEST - KETTLEMAN - MILPITAS SECTION - VOLUME OUT OF STATION =														
Kettleman	0.00																
Panoche	39.41	39.41	40.16	- 30	695.9	645.0	1.120	80	0.670	+ 76,442	- 788	75,654		17.857	35,078		0.00216
	56.82	17.41	17.74	- 385	645.0	609.6	1.114	76	"	+ 49,476	-13,502	35,974		"	15,280		0.00234
	72.50	15.68	15.90	-1358	609.6	562.2	1.106	76	"	+ 61,430	-26,728	34,702		"	13,854		0.00250
	91.27	18.77	18.88	+ 1938	562.2	560.0	1.101	76	"	+ 2,718	+ 34,663	37,381		"	16,368		0.00228
Milpitas	148.28	57.01	57.04	+ 547	560.0	513.9	1.098	73	"	+ 54,359	+ 8,898	63,257		13.178	26,780		0.00236
Kettleman - Milpitas		Average f								+ 244,425	+2,543	246,968			107,460		0.00230
NOTE	Deviation from Bayles' law, y, for May test based on gas with 4.5% N_2, for August test on gas with 2.8% N_2 (See note on Table III for calculation method.)									Flow Formula (see Table III for nomenclature) $f = \frac{y(P_1^2 - P_2^2) + y^2 sh \frac{P_1+P_2}{2}}{KQ^2L}$							

Table 2. Calculation sheet for friction factor tests of the Topock-Milpitas Super Inch pipeline. (References in above table to Table 3 are in error. It should be Table 4.)



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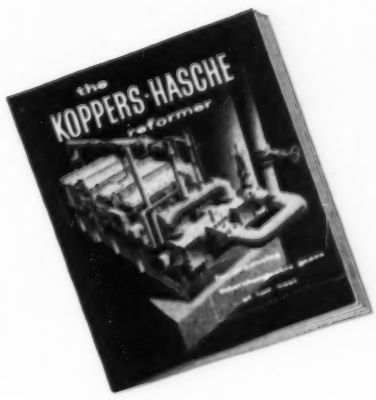

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test periods in order to further minimize variations in observed pressures or flowing volumes.

Points where pressure observations are to be made are established at locations of major changes in elevation as well as at the inlet and outlet to the compressor stations. Pressures are read at 15-minute intervals. Generally, deadweight gauges, calibrated against one another in advance of the tests, are used to make the readings, because in many sections of the line the head effect from changes in elevation results in an almost constant pressure being effective over these sections of the line. (See pressure gradients in *Figs. 1, 2, and 3.*)

Temperatures observed

Gas temperature readings are observed at the inlet and outlet of compressor stations. Specific gravity samples are taken at intervals along the pipeline and for each test the per cent diluents in the gas are analyzed to obtain the proper adjustment for deviation from Boyle's Law. Gas deliveries into and out of the line are also carefully correlated to eliminate any metering errors.

The first friction factor test runs were confined to comparatively short sections of the pipeline. However, experience indicated that the use of short sections was not desirable as, with minimum pressure drops obtaining, the effect of any observational errors in pressure gauge readings was at a maximum. Our general practice has been to conduct a test on either the 354-mile section between Topock and Kettleman or the 148-mile section between Kettleman and Milpitas. Limitations on manpower and on the number of deadweight pressure gauges available will normally not permit a more extensive test to be conducted. On several occasions, however, it has been possible to run a single test for the entire 502-mile pipeline.

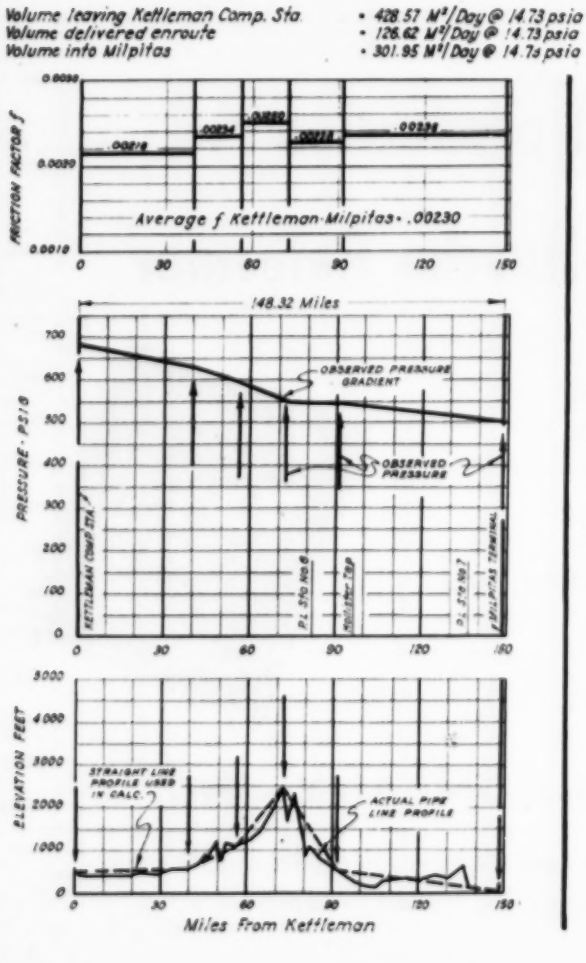
When a friction factor determination is being made, the general procedure has been to run two tests within a period of a week or two. The intent being that the results of the two tests should substantiate each other and thereby validate the results of the test.

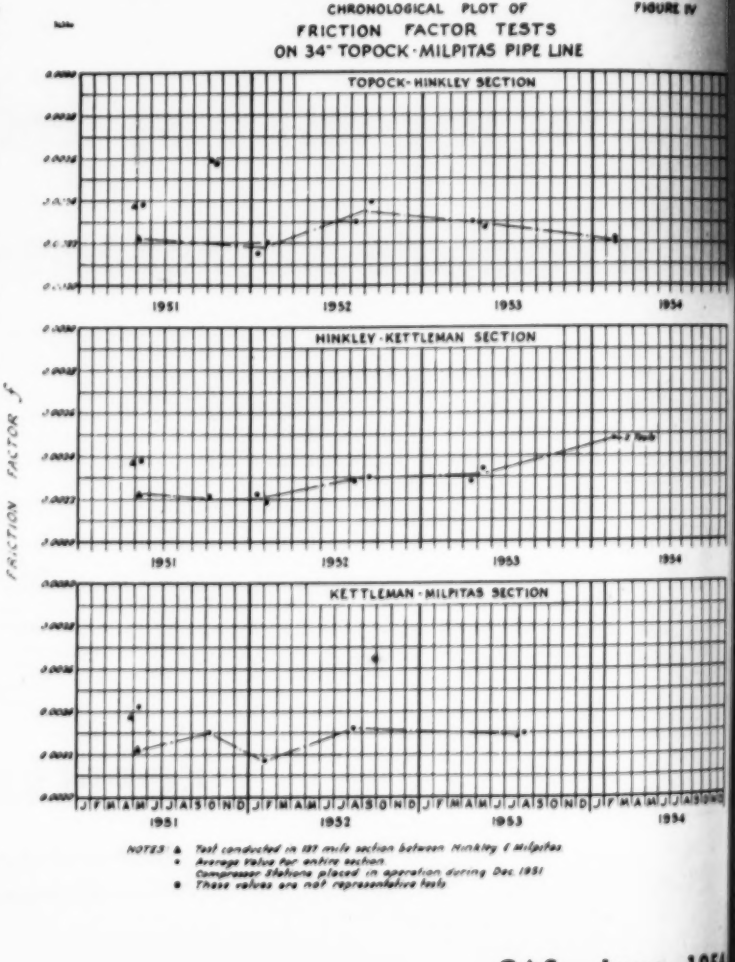
Fig. 1 is a series of three graphs for the Topock-to-Hinkley section of the 34-in. pipeline summarizing data pertinent to a typical friction factor test that was conducted on May 12, 1953. Gas was being delivered north from the Topock compressor station at the rate of 450.19 MMcf per day, and except for a delivery at the rate of 0.360 MMcf per day to the town of Barstow, all the gas was being delivered to Hinkley station. There was no loop main in service during this test.

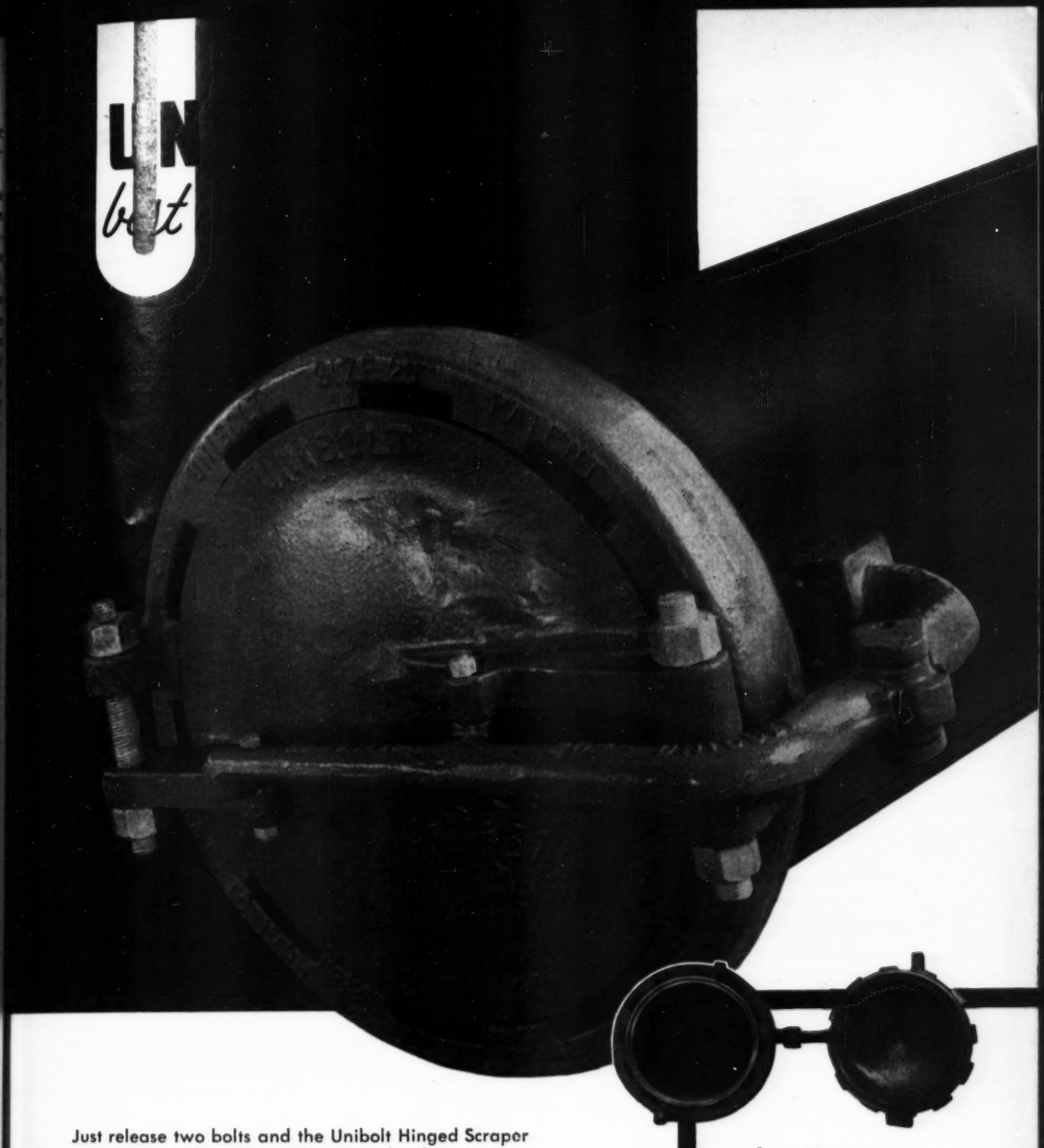
Pressure gauged

At the outset, before any tests were run, it was necessary to so locate pressure gauges that a close approximation of the actual pipeline profile was effected. The resulting "straight line" profile (that is the line drawn through the points where the gauges were located) was used to make the necessary adjus-

Fig. 3 (below). Friction factor test of Kettleman-Milpitas section of 34-in. Topock-to-Milpitas pipeline. **Fig. 4** (right) shows chronological plot of friction factor tests.




CHRONOLOGICAL PLOT OF
FRICTION FACTOR TESTS
ON 34" TOPOCK-MILPITAS PIPE LINE
FIGURE IV
TOPOCK-HINKLEY SECTION
HINKLEY-KETTLEMAN SECTION
KETTLEMAN-MILPITAS SECTION
FRICTION FACTOR f
1951
1952
1953
1954
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
NOTES: ▲ Test conducted in 137 mile section between Hinkley & Milpitas
• Average Value for entire section
Compressor Stations placed in operation during Dec. 1951
• These values are not representative tests



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RECEIPTS AND DELIVERIES FROM
34" TOPOCK-MILPITAS PIPE LINE
DURING FRICTION FACTOR TESTS

May 12, 1953 Test Topock-Hinkley Section

	Tap Location Miles From Topock	Hourly Volume Ending 11 PM	12 M	1 PM	Avg.	Average Hr.Vol. As Equiv. M³/Day
		MCF/Hr				
El Paso Purchase Meter	-	18,868	18,850	18,840	18,853	452.47
Topock Comp. Fuel	0	86	86	86	86	2.06
Needles Delivery	0	10	9	9	9	.22
Barstow Delivery	149.41	16	15	12	15	.36
Delivery to Hinkley Sta.	158.67	18,756	18,740	18,733	18,743	449.83

May 12, 1953 Test Hinkley-Kettleman Section

	Tap Location Miles From Hinkley	Hourly Volume Ending 11 AM	12 AM	Avg.	Average Hr.Vol. As Equiv. M³/Day
		MCF/Hr			
Volume into Hinkley Sta.	0	18,757	18,740	18,748	449.95
Hinkley Comp. Fuel	0	100	100	100	2.40
Victorville Delivery	11.26	43	34	38	.91
Edwards Delivery	43.66	6	7	7	.17
Mojave Delivery	59.37	25	25	25	.60
Delivery to Kettleman Sta.	194.65	18,583	18,574	18,578	445.87

August 12, 1953 Test Kettleman-Milpitas Section

	Tap Location Miles From Kettleman	Hourly Volume Ending 1 PM	2 PM	3 PM	Avg.	Average Hr.Vol. As Equiv. M³/Day
		MCF/Hr				
Volume into Kettleman Sta.	0	17,939	17,977	17,976	17,964	431.14
Kettleman Comp. Fuel	0	106	107	108	107	2.57
Hollister Delivery	97.43	5,280	5,281	5,266	5,276	126.62
Delivery to Milpitas Sta.	148.28	12,553	12,589	12,602	12,581	301.95

Table 3.

The following equation, which is the hydraulic flow equation adjusted for elevation, was used to calculate friction factor on the Topock-Milpitas pipe line:

$$f = \frac{Y\left(P_1^2 - P_2^2\right) + Y^2 \Delta h \left(P_1 + P_2\right)^2}{K Q^2 L}$$

The nomenclature is as follows:

- f = friction factor
- P_1 = pressure at upstream pressure tap, pounds per square inch absolute
- P_2 = pressure at downstream pressure tap, pounds per square inch absolute
- Y = deviation from Boyle's Law
- Q = volume in millions of cubic feet per hour flowing between pressure taps expressed as gas at 60° F. and 30" Hg
- $\Delta h = \frac{Sh\ 520}{1861 \times 14.73 \times 2 \times T} = \frac{0.009384 \times Sh}{T}$
- S = Specific gravity of gas, air = 1.0
- h = change in elevation of pipe line between pressure taps in feet; positive for downhill flow and negative for uphill flow
- T = absolute temperature, degrees Fahrenheit
- $K = \frac{ST \times 10^{12}}{6.25 \times D^5 \times 520}$
- D = inside diameter of pipe line, considered to be 33.25" I.D. in this equation
- L = distance between pressure taps, in miles of equivalent 33.25" pipe

With D = 33.25", K = 7.5711 ST

The deviation Y was determined by method of R. V. Dunkle after ascertaining per cent diluents from an analysis of a gas sample taken from the pipe line during the test period. (See P.C.G.A. Proceedings, Volume 35, page 80 for "Deviation of Natural Gas from Boyle's Law" by R. V. Dunkle).

Table 4.

ments for elevation. The bottom graph on *Fig. 1* shows the comparison between the straight line profile and the actual pipeline profile. The close approximation shown was possible for the reason that, when the pipeline was constructed, pressure taps were installed at about five-mile intervals along the pipeline.

The points where pressures were observed are shown on the middle graph by the vertical arrows below the pressure gradient. The values from which the observed pressure gradient were plotted are the average of the readings taken at 15-min. intervals during the test. The maximum variation in pressure at any observation point was less than half a pound. This small pressure variation was due in great part to having the pipeline stabilized for about 10 hours prior to the test. Not only were pressures well stabilized during the test period, but the hourly variation in the volume into and the volume out of the line was not significant.

Overall friction factor

The top curve on *Fig. 1* is a plot of the friction factor of the Topock-Hinkley section of the pipeline between points of observed pressure. The overall friction factor for the entire section is also indicated. It is of interest to note the conformity of the friction factor tests

Date of Test	Duration Of Test-Hours	Friction Factor f	Volume Out Of Compressor Station M³/D	M³/Hr.	Through Quantity M³/D	M³/Hr.	Specific Gravity Of Gas-Air=1.0	Reynolds' Number-Millions	COMMENTS*
177 Mi. Section of Pipe Line North of Pressure Limiting Station No. 4									
April 26, 1951	1	0.00237	224.33	9.347	224.33	9.347	0.657	8.843	Pressures not too well stabilized.
May 10, 1951	3	0.00222	244.80	10.200	244.80	10.200	0.663	9.738	Steady flow conditions obtained.
Section Between Topock & Hinkley Stations									
October 4, 1951	6	0.00259	242.88	10.120	242.88	10.120	0.660	9.618	Poor test due to either throttled valve or poor pressure ob.
January 15, 1952	3	0.00215	404.30	16.846	404.28	16.845	0.631	15.306	Steady flow conditions obtained.
February 3, 1952	2	0.00220	496.63	20.693	496.61	20.692	0.631	18.802	Flow rate barely stabilized for this test.
August 13, 1952	4	0.00230	412.37	17.182	412.34	17.181	0.647	16.007	Steady flow conditions obtained.
September 10, 1952	5	0.00239	401.83	16.743	401.81	16.742	0.639	15.405	Steady flow conditions obtained.
April 15, 1953	4	0.00230	459.98	19.166	459.96	19.165	0.646	17.828	" " " "
May 12, 1953	3	0.00227	450.19	18.758	450.14	18.756	0.659	17.799	" " " "
February 17, 1954	2	0.00222	638.21	26.592	638.18	26.591	0.635	24.315xx	" " " "
February 19, 1954	4	0.00220	640.66	26.694	640.63	26.693	0.632	24.293xx	" " " "
Section Between Hinkley & Kettleman Stations									
October 4, 1951	6	0.00221	242.88	10.120	242.88	10.120	0.660	9.618	Steady flow conditions obtained.
January 15, 1952	3	0.00222	401.57	16.732	392.81	16.367	0.633	14.919	" " " "
February 3, 1952	2	0.00218	493.46	20.561	490.32	20.430	0.629	18.505	Flow rate barely stabilized for this test.
August 13, 1952	4	0.00228	409.32	17.055	408.99	17.037	0.647	15.873	Steady flow conditions obtained.
September 10, 1952	3	0.00230	399.14	16.631	397.80	16.575	0.639	15.252	" " " "
April 15, 1953	4	0.00228	457.32	19.055	441.00	18.375	0.645	17.067	" " " "
May 12, 1953	2	0.00234	447.55	18.648	446.06	18.586	0.655	17.530	" " " "
February 17, 1954	2	0.00248	632.76	26.365	627.24	26.135	0.635	23.898xx	" " " "
February 19, 1954	5	0.00248	635.11	26.463	626.47	26.103	0.632	23.756xx	" " " "
Section Between Kettleman Station & Milpitas Terminal									
October 4, 1951	6	0.00230	242.88	10.120	224.95	9.373	0.660	8.908	Slightly less stabilized than other sections of pipe line.
February 3, 1952	1	0.00217	490.30	20.429	489.55	20.398	0.629	18.476	Flow rate barely stabilized for this test
August 13, 1952	2	0.00232	381.26	15.886	380.47	15.853	0.636	14.519	Reasonably steady flow conditions obtained.
July 29, 1953	2	0.00228	451.82	18.826	411.19	17.133	0.661	16.308	" " " " "
August 12, 1953	3	0.00230	428.57	17.857	389.64	16.235	0.670	15.664	" " " " "

NOTE: All Volumes are gas at 60°F and 14.73 psia
Reynolds Number = $\frac{Q \times 0.433628}{DZ}$ where Q = through quantity in cu.ft./hr.,
S = Specific gravity, referred to air; Z = .0131 (centipoises); D = 33.25" (diameter)

* All tests run prior to 1954 are for the single pipe line; those run in 1954 have the following sections of loop main installed - 30.5 miles in the Topock-Hinkley section and 84.9 miles in the Hinkley-Kettleman section.
xx Reynolds number calculated for sections of single pipe line for tests run in 1954.

Table 5. Data sheet summarizing friction factor tests on 34-in. Topock-to-Milpitas pipeline.

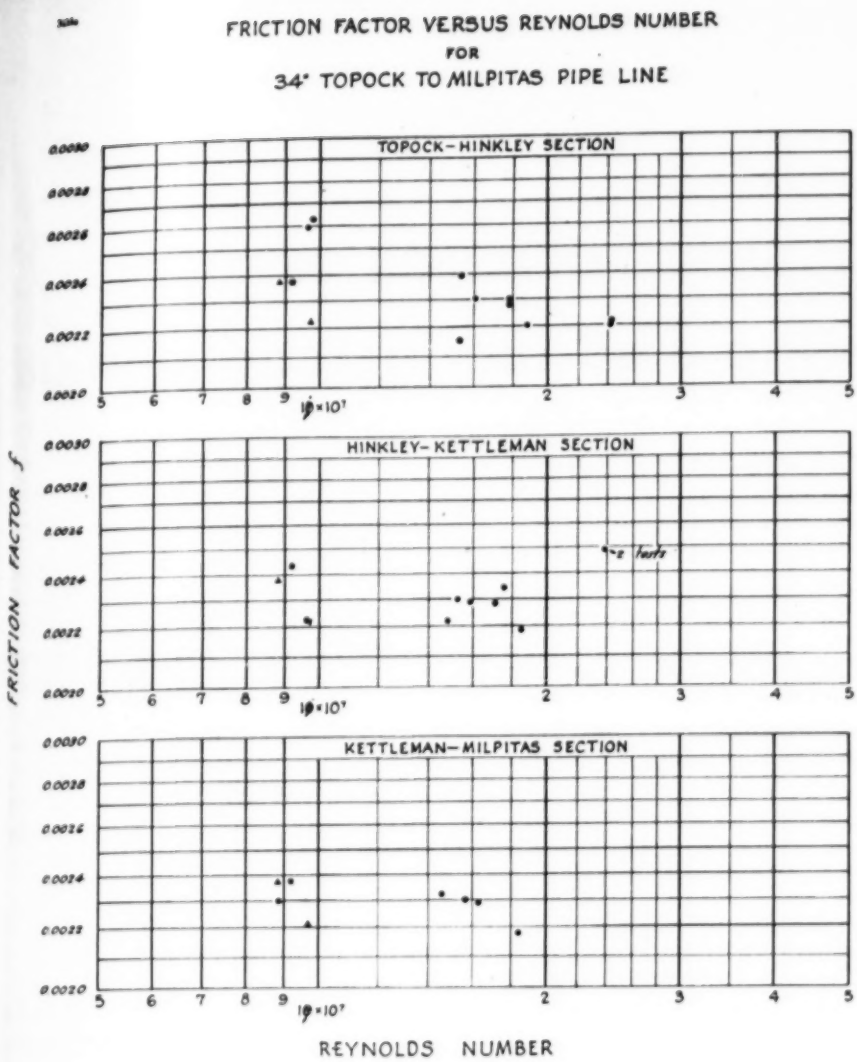

FRICTION FACTOR VERSUS REYNOLDS NUMBER
FOR
34" TOPOCK TO MILPITAS PIPE LINE
TOPOCK-HINKLEY SECTION
HINKLEY-KETTLEMAN SECTION
KETTLEMAN-MILPITAS SECTION
FRICTION FACTOR f
REYNOLDS NUMBER
NOTES:
Test conducted in 137 mile section between Hinkley & Milpitas.
Average Value for entire section.
Compressor Stations placed in operation during Dec 1951
These values are not representative tests.

Fig. 5.

for each of the several sections between pressure gauge locations, with the average valve of f=0.00227 for the entire section between Topock and Hinkley.

Fig. 2 shows a similar plot of the May 12, 1953 friction factor test for the Hinkley to Kettleman section. For the Kettleman-Milpitas section of the Super Inch line, *Fig. 3* depicts the results of a test run on August 12, 1953. Again note how the test values for the individual sections substantiate one another.

Boyle's law

All values of friction factor plotted on *Figs. 1, 2, and 3* include the effect of elevation and deviation from Boyle's Law. Each of these factors has an appreciable effect on the friction factor value. *Table 1* lists the friction factors that would result if these factors were ignored. The average values plotted in *Figs. 1, 2, and 3* are also shown as is the percent change in these values if deviation and elevation were not considered.

Table 2 is a calculation sheet of the friction factors shown on *Figs. 1, 2,* and *3*. All the basic data used in the calculations are listed with the exception of the volumes flowing in the line, which are shown on *Table 3*.

Table 4 lists the flow equation used for calculating the friction factors shown on the graph. This equation, incidentally, is the same one that has been used to design and reinforce this pipeline. For the design calculations, the quantity and friction factor are assumed to be known and pressures then calculated. In the friction factor calculations, quantities and pressures are known and the friction factor is calculated. Reference to *Table 4* will show that all lengths have been converted to a common diameter. In making this conversion, the diameter ratio to the fifth power was used. No adjustment to the pipeline length for valves and fittings was made; if this refinement were to be considered, the friction factors shown should be decreased about 1.5%.

Fig. 4 (see also *Table* 5 for basic data) shows the results of all of the friction factor tests that have been run to date on the Topock-Milpitas pipeline, plotted as a function of time. As can be noted, except in the Hinkley-Kettleman section of the pipeline where there is evidence of a worsening of the friction factor, as shown by the most recent tests of February 1954, the friction factor for the remainder of the pipeline appears to be about at a level.

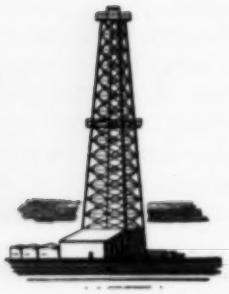
Fig. 5 shows the same "f" values used on *Fig. 4* plotted as a function of Reynolds Number. Again this sype of plot shows the friction factor to be at a level over a wide range of Reynolds number. There is no apparent trend of "f" as a function of Reynolds number.

Summary of data

In summarizing the friction factor data compiled to date, it is a fair statement to say the friction factor of the Super Inch line is presently about equal to 0.0023, except in the Hinkley to Kettleman section, where the friction factor has increased from a starting value of f=0.0022 to a present value of f=0.0025.

Tests of this type on large diameter pipelines are of more than passing interest, for the reason that the investment in a cross-country pipeline such as is typified by the Super Inch pipeline is substantial. Almost $100 million will be the cost of the Topock-Milpitas pipeline project as built to deliver 700 MMcf per day.

If a close design tolerance is being observed, any worsening of the friction factor could require a substantial outlay of additional capital to overcome the adverse change of friction factor. For example, a careful calculation has shown that to increase deliveries from 550 to 700 MMcf per day on this pipeline, with all factors except "f", the friction factor, being constant, a variation in "f" of from .0023 to .00255, or about 10%, would change the capital improvements required about $3.8 million of 15%. While the per cent change is perhaps not too great, the incremental dollars of added capital do represent a significant amount of money.



Drilling wells with gas as a circulating medium instead of mud

By W. T. HOLLIS • El Paso Natural Gas Co., Farmington, N. M.

WE HAVE all heard the saying that "Necessity is the mother of invention," and although we do not look upon the replacement of drilling mud with gas as an invention, certainly its development was a necessity in some areas.

Drilling program

In 1950 my company was faced with the problem of having to drill some 500 to 600 wells in the San Juan basin of northwest New Mexico. The need for such a program was to supply gas for our California market.

These wells were to be completed in the Mesa Verde formation of Cretaceous Age, which consists of 800 ft of interbedded sands, shales, and coal, at an average depth of 5000 ft! This gas-saturated formation has very low porosity, permeability, and a reservoir pressure of 1280 psig. Wells range in natural potential from less than 100 Mcf/D to 5000 Mcf/D, while after shooting their potentials increase from 2000 Mcf/D to 20,000 Mcf/D.

Excessive mud costs

Lost circulation problems made it practically impossible to drill the Mesa Verde with mud without experiencing excessive mud costs as well as the plugging action of lost circulation material on the gas zone. Further damage to the formation was caused by the swelling action of bentonite, within the gas zone, when drilling mud and water came in contact with it. Cable tool drilling was tried with the results being slow completions and continuous fishing jobs. It would often take five to eight weeks to drill the 800 ft of hole, and after this interval "open" with as much as 2300 quarts of solidified nitroglycerin, the cleaning-out process further increased the hazards of cable tool operations. Therefore, in order to meet our market demands and drilling commitments, it became apparent that a faster and more economical completion method had to be developed, as well as some method that would insure a clean producing formation so as to increase potentials and deliverability.

Our first experiment with gas drilling was begun on May 2, 1951, and the 827 ft of hole was drilled in 27 hours of total elapsed time. This included two trips to change and inspect the bits, which was unnecessary as both bits were pulled "green." The hole was then shot and cleaned out with gas without difficulty.

Wellhead hookup

The wellhead hookup underneath the rig floor consists of a 7-in. master valve on top of the tubing head, then the blowout preventor, next a tee which is used for the vent line connection, and finally the rotating drilling head which forms the seal around the drill pipe and kelly. Drilling gas, which is obtained from a nearby well or pipeline, is brought into the stand-pipe at an average pressure of 400 psig and 2200 Mcf. It flows through the rubber drilling hose, down the drill pipe, around the bit, up the annulus, out the flow line and is burned 300 ft from the rig.

Extra equipment

The only extra equipment required for gas drilling is the master valve, tee, rotating head, and a simple piping set-up for the drilling gas system. It has been found that the conventional hard formation type bit is just as effective as the specially designed air jet bit.

When drilling at a depth of 5000 ft, the samples will reach the surface in one to two minutes and are in a fine powder form, similar to face powder or dust. As the bit drills through different

TABLE 1. AVERAGE DATA ON WELLS DRILLED WITH GAS

1. Gas volume used	2200 Mcf/D
2. Gas pressure used	400 psig
3. Length of time to drill the average footage of 782 ft/well	4.6 days or 212 ft/day
4. Drilling time:	
Upper Mesa Verde	4 min/ft
Middle and lower Mesa Verde	1 min/ft
5. Footage drilled per bit	264 ft
6. Weight on bit	12,000 lb
7. Size of bits	mostly 6¼ in.
8. Maximum footage drilled with one bit	891 ft
10. Maximum size hole drilled	11 in.

RECORD ANTICIPATED BY CLARK

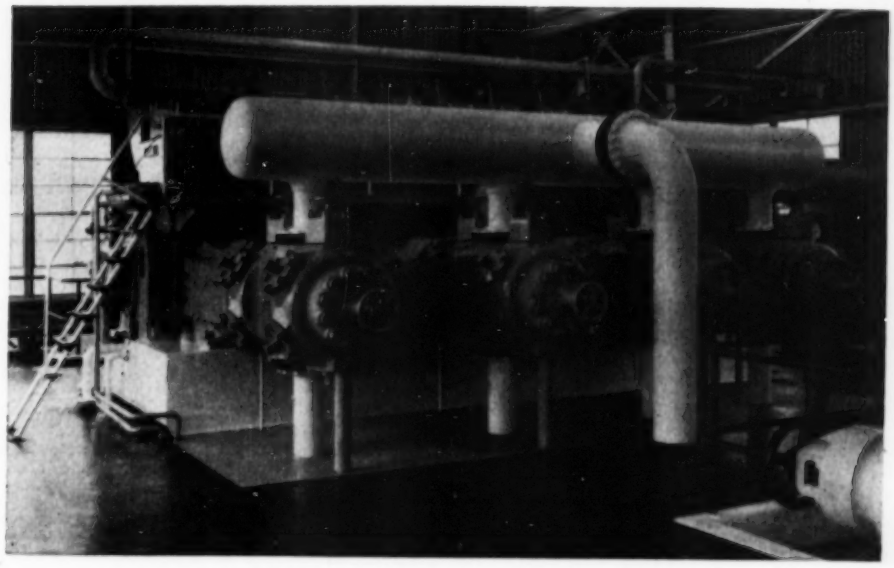
Of course, performance records such as this were not unexpected. According to Clark engineers, the TRA and TLA were specifically *designed* from the ground up as turbocharged, 2-cycle, gas-engine-driven compressors with all components perfectly matched. They were *designed* to burn 10 to 12½% less fuel, to require 40% less cooling water and to deliver considerably more power in 25 to 30% less floorspace than comparable non-turbocharged compressors.

BIG BOON TO OPERATING ECONOMY

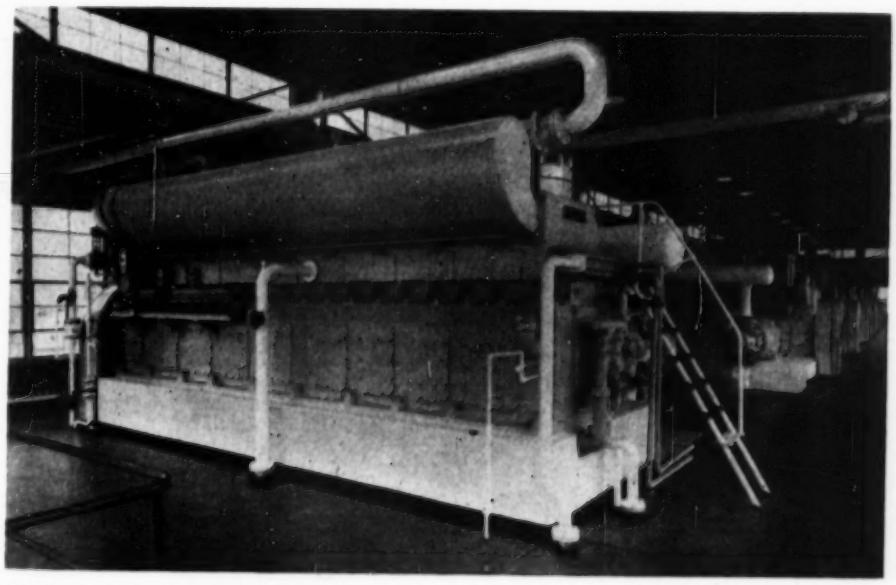
With operating economies more essential today than at any time in history, the new TRA and TLA have already proved to be one of the most practical means of decreasing compressor operating and installation costs per bhp, according to Clark engineers.

NEW LITERATURE PUBLISHED

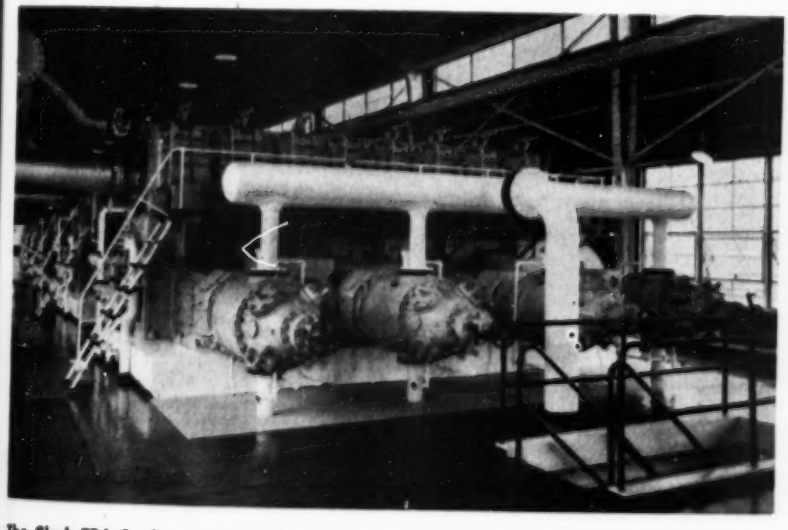
Clark Turbocharged Compressors are built in the 825-3300 BHP range. Bulletins 130 and 134, describing Models TRA and TLA respectively, are available by writing Clark Bros. Co., Division of Dresser Operations, Inc., Olean, New York.



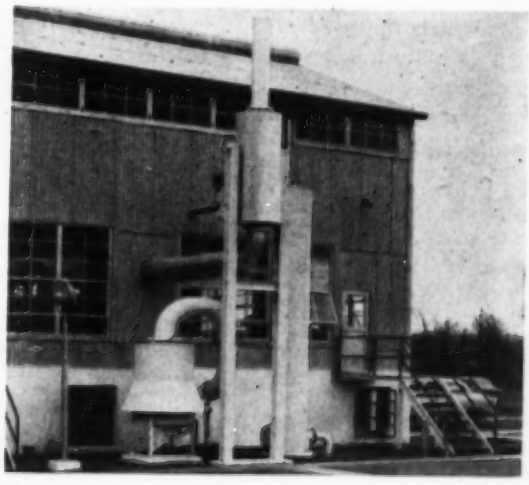
Tennessee Gas Transmission Co.'s TRA-8 is equipped with four Clark air cooled pipeline type compressor cylinders.



Minimum of piping required for Clark Turbocharged Compressor is exhibited in this view of the TRA-8, from the exhaust manifold side, at Tennessee Gas Transmission Co.'s Middleton station.



The Clark TRA-8 along with 7 Clark HBA-8 Compressors is housed in this Tennessee Gas Transmission Co. building. A total of 26 Clark "Big Angles" are housed in three buildings at the Middleton, Tenn. station.



Exterior of compressor building shows the simplicity of Clark Turbocharged Compressor installation. Notice that only one air inlet pipe, one exhaust pipe, one muffler and one air cleaner are required.

TABLE 2. AVERAGE DATA ON CORING OPERATIONS

1. Gas volume used	2200 Mcf/D
2. Gas pressure used	400 psig
3. Footage cored	271 ft
4. Coring time	6 min/ft
5. Core heads used per well	1 to 3
6. Weight on core head	17,000 lb
7. Rotary speed	40 rpm
8. Size of core head	6⅛ in.
9. Recovery	85%

formations the color of this dust will change. For instance, a coal formation will have a black dust, a shale formation dark brown, and a sand will be white. Visual inspection of the flow line will indicate the type formation being drilled and a lithologic log of the well can be obtained by merely catching the samples at the end of the flow line.

Decreased cost

Costs of wells in the San Juan basin have been decreased approximately $20,000 per well, and completion time as much as a month to six weeks, but the most important result has been the increased potentials and higher deliverabilities. For example, there were three particular wells that were completed for a potential of approximately 500 Mcf/D by the use of conventional methods. But after plugging back, milling a window, and drilling a directional hole with gas, these same wells were completed for a potential of 5000 Mcf/D.

Since the date of our first experiment, we have drilled 295 wells with gas and other operators have drilled approximately 300 more for a total of approximately 600 wells. The average data shown in *Table 1* have been compiled from our operations.

Seven wells cored

Using the conventional diamond core barrel and core head, we have cored the sand members of the Mesa Verde in seven wells. The average data for this type of operation is shown in *Table 2*.

Other applications of gas drilling have also been successful such as: (1) milling a window in casing and whipstocking, (2) fishing in open hole, and (3) drain hole drilling.

Fire is the most commonly considered hazard connected with gas drilling, and certainly it should be given serious consideration. However, if rig personnel are instructed carefully, drilling head rubbers changed often, engine exhausts injected with water, and the flow lines laid at least 300 ft from the rig and the gas burned, then there will be little need for concern. There have been four or five fires in the San Juan basin and all of them can be traced to carelessness on the part of the personnel rather than the actual drilling-with-gas operations. None of these fires occurred during actual drilling operations but were started while landing tubing or while out of the hole changing the bit, due to carelessness or forgetfulness in the use of matches.

Liquid hazard

Liquid, whether it be water, distillate or oil, is also a hazard in that it will cause the formation to slough and increase the danger of sticking the drill pipe. Wet cuttings will also form wall cake on the casing, making it difficult and sometimes impossible to make a trip. In our operations we can usually drill the wet spots by increasing the pressure and volume and by only drilling a few feet of hole before making a trip to clean the casing. It sometimes is necessary to set liners through the moisture, squeeze with cement, or return to conventional methods of drilling.

Gas encountered

In a few cases large volumes of gas have been encountered and, if not handled carefully, can be extremely dangerous, especially while making a trip. El Paso has drilled-in wells flowing 36 MMcf of natural, and other companies in the state of Utah have drilled-in wells flowing as high as 55 MMcf per day.

The danger of crooked holes is sometimes thought to be greater when using gas than when using mud. However, it is our opinion that crooked holes are more the fault of the area than the circulating medium. While trying to drill one hole from underneath surface pipe with gas, El Paso experienced crooked hole trouble. However, after returning to mud circulation, our troubles were not eliminated. This well was located in an area where steep dips are encountered and crooked holes are frequently drilled.

Sand blasting effects might also be considered as hazardous; however, after 2½ years of operations, there have not been any tool joint failures due to this action. Erosion does occur on shoulders of standard tool joints but if flush joint or double streamline drill pipe is used, the sand blasting effect is not noticeable. Neither has there been any damage to wellhead equipment.

Less wastage

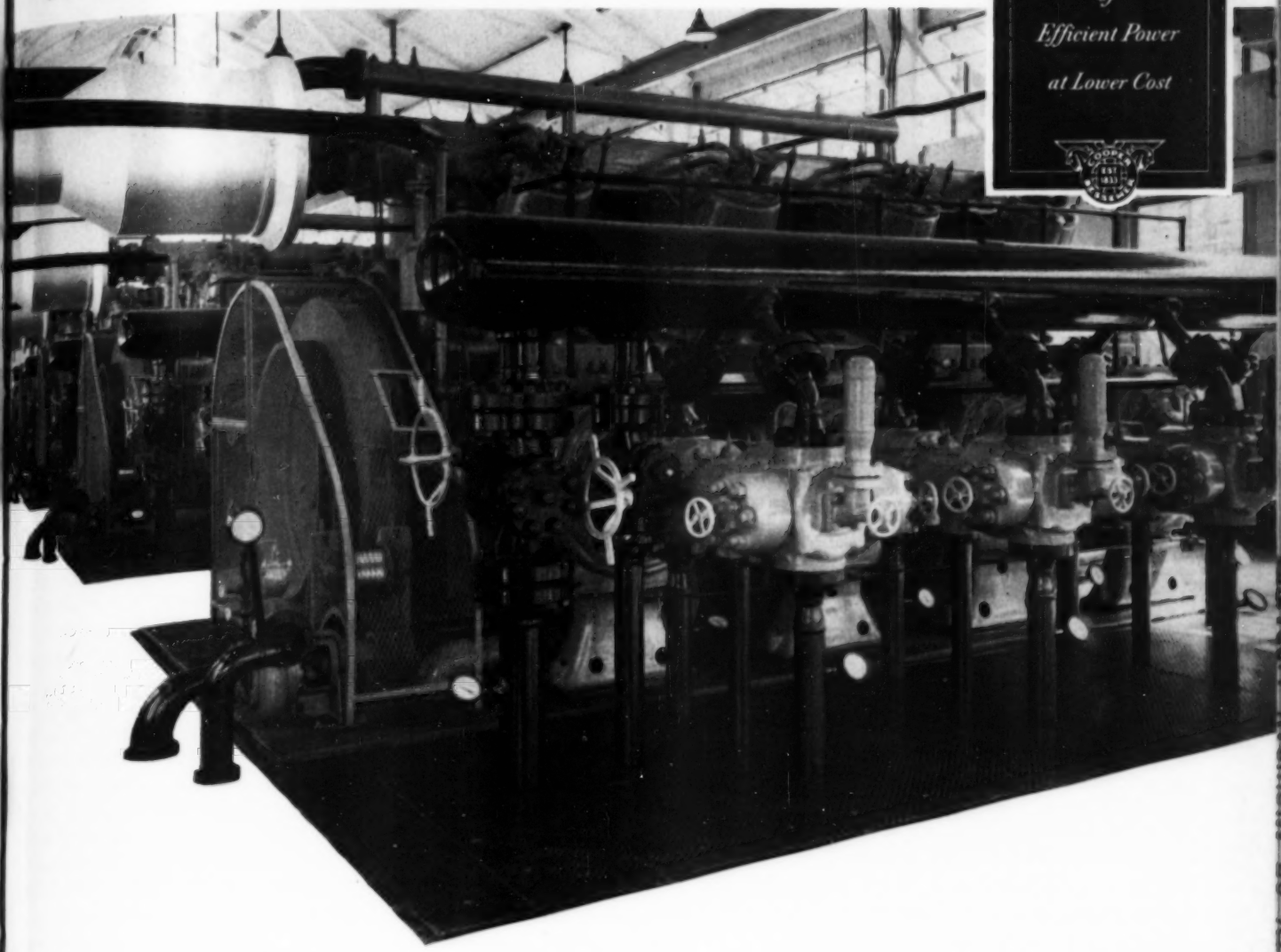
The conservation of natural gas is of prime importance in any area. However, we believe that less gas is wasted by gas drilling operations than by cable-tool drilling, where the formation was allowed to produce to the atmosphere for weeks.

We believe that it is a fair statement to say that drilling with gas has "made" the San Juan basin by putting well completions on an efficient and economical basis. And this technique is rapidly finding its place in the drilling industry in other areas.

This article has been adapted from a talk presented at the March 4-5 AGA gas supply, transmission and storage conference in New Orleans.

Cooper-Bessemer double deck valves permit previously unheard of pressure flexibility in this GMV installation at Coco, West Virginia.

Another Example of Efficient Power at Lower Cost



A new high in FLEXIBILITY FOR UNDERGROUND STORAGE . . . with COOPER-BESSEMER GMV'S

Because of their unsurpassed flexibility, Cooper-Bessemer compressors were recently selected by The United Fuel Gas Company to pump gas over the wide range of pressures required by an underground storage station.

The Coco Compressor Station, located at Coco, West Virginia and powered by five 880 hp Cooper-Bessemer Model GMV-8-TF compressor units, is one of the larger storage stations in the country. Each GMV is equipped with four 7" diameter compressor cylinders having a working pressure of 2,000 psi. The GMV's operate against the following variable pressure conditions:

Pumping to Storage

Suction Pressure: 740-850 psig
Discharge Pressure: 900-1900 psig

Pumping from Storage

Suction Pressure: 400-750 psig
Discharge Pressure: 800-900 psig

An important part of this previously unheard of flexibility, available with Cooper-Bessemer compressors, is obtained by using double deck valves. A valve cap unloader replaces the usual flat valve cap. In addition, a bottle type unloader is installed in the outer head of each compressor cylinder. This means twenty unloaders per unit, thus twenty possible unloading steps to handle each pressure condition.

For efficient operation under varying conditions of gas pressure and volume, for compactness, long service life, and low maintenance, you will find Cooper-Bessemer offers the best in dependable low-cost compressor service.

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Escalating field prices are already bringing city gate rates into a bracket whereby manufactured gas can compete in many areas.

Will manufactured oil gas set the ceiling on natural gas prices?

By **WILLIAM B. TIPPY, Executive Vice President** • Commonwealth Services Inc., New York

THE upper limit to which the price of natural gas at the wellhead in the southwestern gas fields can go, without having competition from substitute gases cause a cutback on sales and hence on gas production, has virtually been reached in one part of the United States with the city gate rates for service now in effect in New England. A demand charge of $4.75 per Mcf of contract demand per month, a commodity charge of 31-½ cents per Mcf and a maximum allowed annual load factor of 74% means that 52½ cents per Mcf is the lowest attainable average price for gas at the city gate from one of the two lines serving New England. During the development period, the other line charged a ceiling price of 53 cents per Mcf, but city gate prices will rise above this figure when the development period is over. Sixty cents per Mcf is a more probable average price as distribution company annual load factors approach 50%. Where domestic space heating has an annual load of around 27½%, the incremental cost of gas to serve added space heating business alone would be around 88 cents per Mcf.

What competition is there? Several gas distribution systems in New England already have high-Btu oil gas manufacturing equipment, which, they state, is capable of producing a satisfactory substitute gas for a direct operating cost of 55 cents to 60 cents per Mcf of natural gas equivalent. Fixed charges are not included in this figure because of the present policy of some of these companies to maintain standby plants up to 100% of peak requirements anyway.

Even though the costs of manufacturing oil gas will run somewhat higher when these companies use natural gas for base load and only manufacture during the peak periods, the peak shaving they do will undoubtedly cut deep into what would otherwise be pipeline contract demands and they will still manufacture substantial annual volumes of high-Btu oil gas to supplement the natural gas they receive. About one substantial rate increase and the more efficient former manufactured gas companies in New England will be placed in the position where, to the extent that their facilities are adequate in capacity, they will be money ahead to manufacture their added gas requirements as their loads grow and hold their natural gas takes to minimum contract demands used at the highest permissible annual load factor.

Not limited

Nor is the situation limited to New England. In Florida there is no natural gas service at present except in the end of the Panhandle around Pensacola. Because of the unusually fine climate, an occasional cool overcast day will create a substantial peak day heating requirement but the annual volumes required for space heating are very low. The non-space heating portion of the residential and commercial load is subject to a seasonal variation, although this effect has been decreasing in recent years with the build-up of more year-round business and should improve further with the promotion of gas air conditioning, and may now have an annual load factor of 60% to 65%.

For one company serving the Miami Beach-North Miami-Fort Lauderdale area, the total sendout to 45,000 customers was expected to be about 90,000 therms if a heavy peak day occurred this winter, such as is experienced every few years. With such a peak sendout the company's annual load factor would be about 30%. If the effects of peak day sendouts due to weather were excluded, the winter peak would only be about 40,000 therms and the annual load factor of the non-heating gas would be about 65%. The company manufactures high-Btu oil gas efficiently at a present cost of production, excluding fixed charges, in the neighborhood of 90 cents per Mcf of 1000 Btu natural gas equivalent. This is somewhat higher than comparable New England costs, principally because of the distance by-product residual light oils and tars must be shipped to reach bulk markets.

What would natural gas mean to this Florida company? Very little. If natural gas were made available at the same rates as in New England—and the distance from southern Florida to existing major pipeline facilities in Georgia would make pipeline gas from the Southwest at least that expensive in the opinion of many engineers—natural gas would cost the company 83½ cents per Mcf, or but little below the production cost of the company's own manufactured gas supply. Even if the company peak shaved all its space heating requirements the resulting cost of natural gas for the balance of its requirements would be 55½ cents per Mcf. From this it would appear highly improbable that pipeline gas from the Southwest can be piped into southern Florida at a price sufficiently attractive to persuade an efficient manufactured gas operation to change over.

Drilling results

Drilling programs of the major oil companies now in progress in Florida, however, could result in the discovery of supplies of local natural gas. Should this occur, the distances and cost of transportation to other markets may well result in working out a low enough price for such local natural gas to make its introduction into the local Florida markets economically worthwhile, but natural gas from out of the state looks like a doubtful possibility.

Yes, it's Youngstown

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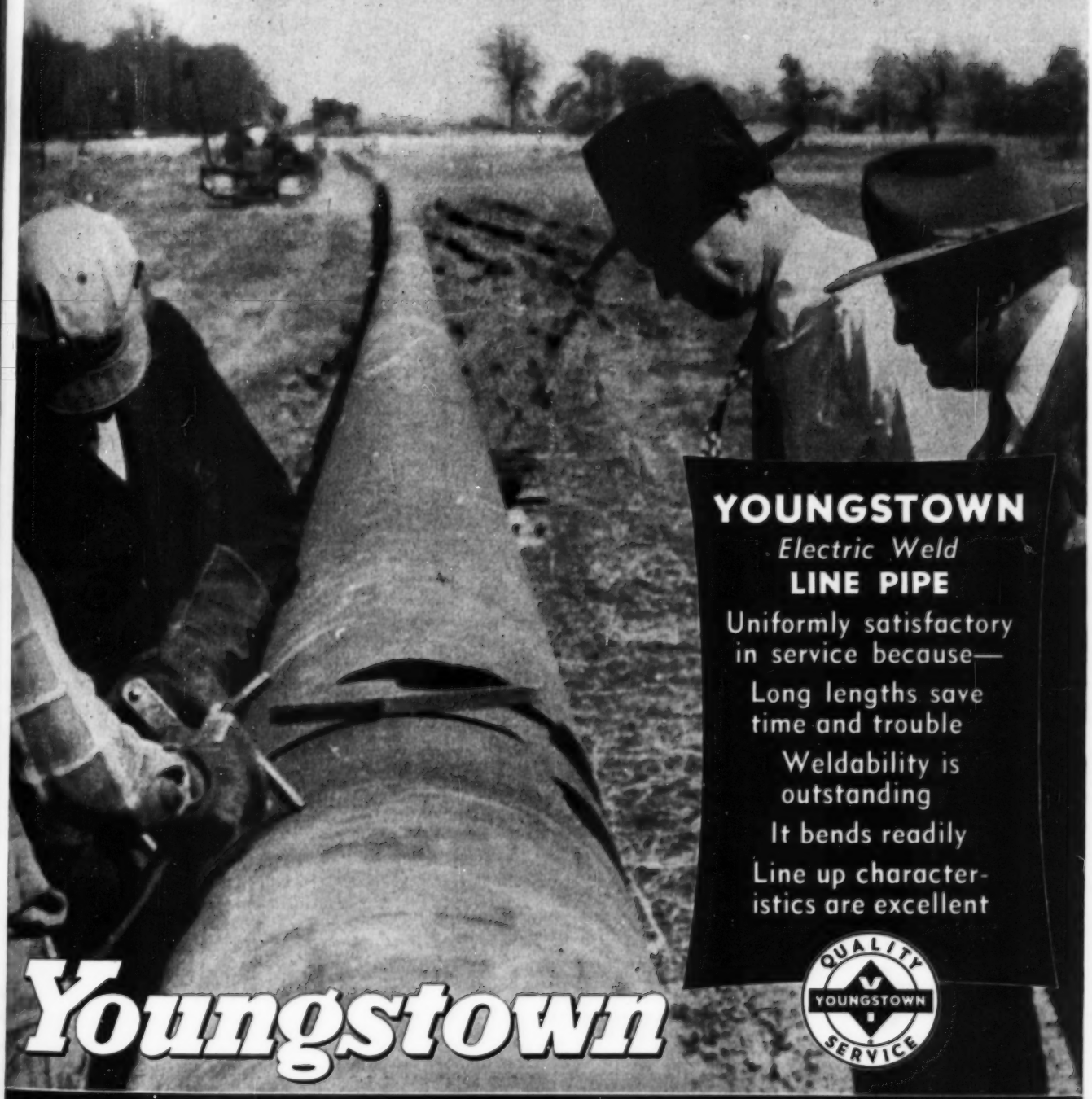

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At the other end of the country in the Pacific Northwest, where the struggle between competing applicants to bring in natural gas is not yet settled, sharp competition from low-priced electricity for the domestic cooking, refrigeration and water heating loads and from low-priced oil for industrial loads, together with the need for substantial industrial sales to provide adequate total volumes for economic justification of the long distance transmission lines, have placed an effective ceiling on the price the local distribution companies can afford to pay for natural gas at around 35 cents per Mcf, according to testimony presented before the Federal Power Commission. The principal distribution companies in the area, serving Portland and Seattle, produce oil gas efficiently but indicate they need large volumes of relatively low priced natural gas if they are to be able to expand their markets materially in the face of competition. Both pipeline applicants seem agreed that they must deliver gas at around 35 cents per Mcf and that this is about as low a price as either of them can establish to serve the area.

To insure price stability at an economic level, one applicant, proposing to take gas from the Four-Corners area of the San Juan basin in the Southwest, has worked out an arrangement for purchasing outright at definite prices a substantial portion of its gas supplies in the form of unproduced gas reserves in place, instead of purchasing all its gas, as it is produced from day to day under standard purchase contracts which may be renegotiated as to price every time the pipeline needs more gas from the producer, or which may be subject to "favored nations" clauses or state-determined field prices that would increase the price of gas without any action at all on the part of the purchasing pipeline. At any rate, service to the Pacific Northwest, if and when authorized, looks as though it will commence at or very near the economic ceiling on pipeline price.

Nor are these ceilings limited entirely to the extreme corners of the United States. In a recently agreed rate settlement concerning one of the major midwestern pipelines, special treatment was accorded one area on the ground that the low priced electric competition it faced would not permit it to absorb its full share of the pipeline increase and still remain competitive locally. There was also rumor of a substantial volume of Williston basin gas having been without a buyer for some time because the price asked by the producer would not permit its transportation to relatively nearby markets for resale at a retail price that would meet the competition of local low-cost solid fuels for domestic space heating purposes.

These straws in the wind seem to indicate that the ceiling on the price of natural gas in the field is being approached—perhaps more rapidly than the producers and royalty owners are aware. Once again efficient manufactured gas processes and companies employing them can come out of the "dog house" into which the vision of cheap natural gas placed them some years ago and again assume their rightful status on their own merits. High-Btu oil gas is the lowest cost type of gas manufactured in the country today but research goes forward on many fronts toward a process for complete gasification of coal, with promise of even lower costs ultimately. Higher natural gas prices will accelerate this search for acceptable substitutes which in turn will establish and perhaps ultimately lower further the competitive ceiling for the price of natural gas.

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POWER OPERATION

(Above) High Pressure Gate Valve with Ledeen Valve Actuator.

(Left) Ledeen Tandem Type Valve Actuator on Standard Plug Valve.

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These actuators are for the automatic operation of gate, diaphragm, plug and other line valves, and are pneumatically or hydraulically operated for direct or remote control. Designed as package units, they are mounted directly on the valves without need of special manifolds or outside supports. They are easily, quickly and rigidly installed on new valves or on valves in service.

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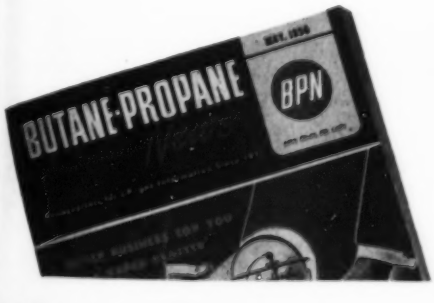

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Pipeline Communications and Electronics

By FRANK CHAPMAN

Integrated microwave communications

Frank Chapman

The gas pipeline microwave circuit of the future will merely be an operating link in an extensive control and communications network that will be used to serve every department of the company in one way or another. No prediction as to the future of microwave becomes more obvious than this when one listens to men across the country who are responsible for the communications systems of the nation's long pipelines and who must plan for the future needs of these lines.

Microwave communications is but one small part of an overall development toward automatic control through electronics—called "automation" or the science of cybernetics—that is sweeping across all industry, with gas pipelining as no exception. The other component parts of the network include telemetering equipment, the digital computer with its input and output equipment, the variety of equipment designed for remote and automatic control, memory storage devices, and miscellaneous other equipment that has been or will be applied to automatic control. The place of microwave is somewhere in the middle of this network and, particularly with the widespread operations that characterize gas pipelining, will supply the essential link that will integrate the components of the network into an operating system.

Because no fixed pattern has been set for pulling together the various parts of this network it is difficult at the present time to refer to any actual operating examples. However, mention of the work that is progressing on isolated phases of the network and the thought that is going into the development of certain component parts will give a general picture of how a working network of the future may appear.

Those who are charged with the task of load forecasting are looking to electronics for methods of more accurately and more efficiently predicting load conditions and for programming the results of these predictions for most economical dispatching. This process has two basic requirements: the immediate availability of a great amount of data from widely separated points throughout the company's system, and a means of mathematically processing these data in a short length of time to arrive at a result in terms of a load prediction.

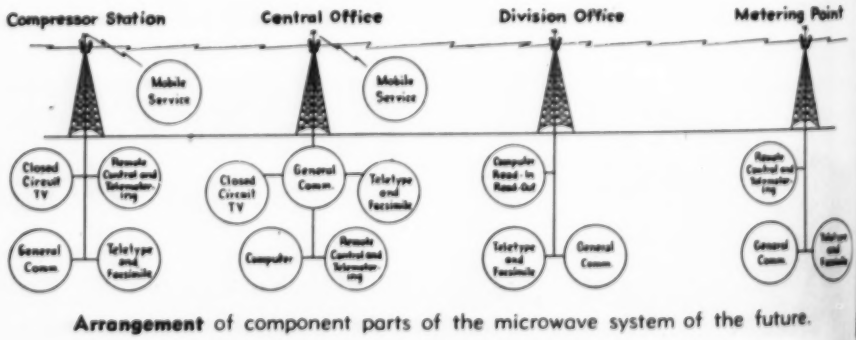
Teletype equipment has been in use for some time for the transmission of weather forecasts. Only recently, however, has facsimile equipment been put to use for the transmission and reception of weather maps which give up-to-the-minute information on weather throughout the country. At the present time Northern Natural Gas Co. is using facsimile equipment to receive weather maps from the U. S. Government. Through the use of teletype and facsimile, therefore, it is possible to gather weather information from throughout the company's system area and over the country as a whole. The same equipment may be used, along with telemetering equipment, to gather gas flow and pressure figures from any number of points along the line.

The following part of the task, that of processing the data that must be used in arriving at a load prediction, involves the use of a digital computer. Many throughout the industry are presently giving serious thought to the use of computers for this purpose. Without going into the actual operations involved in this procedure, it may be pointed out that because of the time element involved it will eventually be necessary that data be automatically fed into the computer from the many widely separated points throughout the system where it is available. This envisages a highly integrated network that makes the microwave transmission system a part of the computer's read-in equipment.

The computer may, also, read-out into a microwave channel if load prediction is required at points along the company's pipeline system. This, in effect, would tie both sides of the computer into the company's microwave system.

A related function for an entirely different department of the company would put the same computer in use to make up a payroll. Of particular concern here, as in the case of load forecasting, is the time required to gather the information necessary to make up a payroll and the dispatching of pay checks. With a pipeline company's operations strung out as far as 1000 miles or more along a pipeline a considerable delay can be involved in handling a payroll.

With stored payroll instructions a single computer could be used to make up a complete payroll for the entire company. Labor charges could either be sent into the central location, or wherever the computer is located, by teletype or facsimile, or fed directly into the computer input system off the microwave circuit. In the latter instance the division accounting department, regardless of where located, would be feeding figures directly into the machine as if it were located in the division



Arrangement of component parts of the microwave system of the future.

For its North Dakota products line the Standard Oil Company (Indiana) selected

New Light-weight, reinforced TRANSHIELD

ASBESTOS PIPE LINE FELT

Stretching a distance of 200 miles from Mandan, N. D. to Moorhead, Minn., the new products pipe line will provide a valuable link connecting the new Mandan refinery with the mid-western products pipe line system of the Standard Oil Company (Indiana).

Permits high speed wrapping... assures effective protection for enamels

On the job shown above, coating and wrapping rates up to 17,000 feet per day were reported. This remarkable record is a tribute to Transhield's special tear-free reinforcement. This reinforcement is accomplished through the use of continuous glass yarns, parallel spaced on ¼" centers.

Designed for average soil conditions, Transhield is a light-weight felt composed of coal-tar saturated asbestos. This time-tested material assures an efficient barrier between pipe line enamels and earth loads . . . soil stresses.

As an outer sheath to retard cold flow, Transhield takes advantage of the full thickness of the enamel coating—working effectively toward preserving a continuous film of enamel on the pipe line.

Long-Length Rolls—Available in 800-ft. rolls (14" O.D., 2" I.D.) for traveling power-driven coating and wrapping machines. Other lengths can be furnished to suit your method of application. Widths are from 2" to 36".

Johns-Manville has developed three wrapping materials for pipe line protection:

J-M 15-lb. Asbestos Pipe Line Felt (perforated or unperforated)—for severe soil conditions.

J-M Transhield Asbestos Pipe Line Felt—for average soil conditions.

J-M Trantex polyvinyl pressure sensitive tape—for pipe line corrosion protection where ease of application is important such as when coating field joints of mill-wrapped pipe or making emergency pipe line repairs.

For further information write Oil Industry Department Johns-Manville, Box 60, New York 16, N. Y.

Johns-Manville ASBESTOS PIPE LINE FELT

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office rather than the central office.

The computer read-out could be used to actually record the payroll at the division office where payment is to be made. In an operation of this kind all payroll records would be kept at a central location and all data would be stored on some form of memory device.

Although these are two of the most obvious uses to which a digital computer may be put there are others of equal value. The same can be said of the teletype and facsimile equipment used as a part of the network operation. The flow of administrative letters, reports and other similar matter, for example, could be transmitted from office to office over microwave circuits by facsimile during "off" hours for a saving in time and money.

Telemetering and remote control are, of course, logical candidates for use of a microwave circuit. The use of a closed circuit television in conjunction with remote control is another possibility that must not be overlooked.

To bring about the realization of such a system is going to require the cooperative efforts of those concerned with each component part. The computer people must concern themselves with the limitations of the microwave circuit in the design of their input and output devices. Those who are concerned with the design of facsimile equipment must also be concerned with microwave limitations and output requirements, insofar as speed is concerned, of the computer. More than either of these, however, is the interest that the communications engineer must have in the transmission requirements of any and all terminal equipment. Channels must have both the frequency response and the dynamic range to accommodate any terminal equipment that might come into use. At the same time, the flexibility of terminal input equipment must be considered in an effort to make the system most accessible to any application.

The communications engineer must realize that the microwave circuit of the future will be but a link in a widespread network, and it must be made to accommodate all component parts of this network.

Collins issues microwave bulletin

A new bulletin entitled, "Microwave by Collins," which describes the complete line of microwave radio and multiplexing equipment available to the industry, has been released by Collins Radio Co., Cedar Rapids, Iowa.

The equipment described can be used in conjunction with existing wire lines or other facilities to provide communication circuits suitable for telephone, teletype, telemetering, supervisory control, facsimile and video transmission. The radio frequency section of the equipment can be supplied for operation in the 5925-7500 mc. portion of the spectrum.

The radio frequency unit provides for continuous or simultaneous transmission and reception over the same antenna on main or standby equipment. The Collins unit makes use of bilateral single sideband suppressed carrier modulation wherein the carrier is shared between two radio frequency amplifiers that are separately amplitude modulated. The separately modulated outputs of the two amplifiers are each applied to a mechanical filter, one of which passes only the upper sideband and the other the lower sideband. The final output, therefore, consists of an upper and a lower sideband, each containing separate intelligence without a carrier. These outputs are combined in a multiplex line amplifier and used to frequency modulate the microwave transmitter klystron.

The Collins multiplexing equipment described in the bulletin provides simultaneous transmission and reception for as many as 24 voice circuits. Sub-carrier frequencies are derived from a 250 kc. master crystal oscillator. Channelization is accomplished by division and subsequent multiplication and heterodyning of the crystal frequency.

PIEA-PESA meets in Dallas

The relationship between common carrier and private ownership of radio facilities came in for widespread discussion at the 26th annual conference of the Petroleum Industry Electrical Association and the Petroleum Electric Supply Association held in Dallas in early April.

Speaking for the FCC, Lester W. Spillane, assistant chief of the Safety and Special Radio Service bureau, told the conferees that there is nothing new about present-day leasing and maintenance agreements where the user obtains the license on frequencies for which he is available. He indicated that in the past the primary problem of the commission has been to insure and insist that any such arrangements in no way affect or limit the licensee's control of his stations, or in any way purport to relieve him of his responsibility under the Communications act and the FCC's rules.

Discussing this matter further, Mr. Spillane said that "equipment and maintenance contracts may satisfy our control requirements and operating conditions, and they may present no specific problems of control. Assume that over the years more and more of the systems do, in fact, pass into the operating orbit of the common carriers. The resemblance between service provided by the common carriers on their own frequencies and that provided by them on user channels under leasing arrangements may become so close as to be indistinguishable."

In his comments upon the same matter Joseph E. Keller, special representative of the Central Committee on Radio Facilities of the API and of the National Petroleum Radio Frequency Coordinating Association pointed out that the petroleum and natural gas industries should continue to review their contracts and arrangements that involve the use of frequencies assigned to the petroleum radio services. The special representative pointed out that these frequencies were allocated by the commission for private use, as opposed to common carrier use, and that "such use ought not to be confused or intermingled with any hybrid common-carrier usages." It was suggested that if the common carriers are using private facilities to furnish radio communication service there arises a strong argument in favor of having such frequencies assigned exclusively to common carriers "on the purported theory that such assignment would make for more efficient use of such frequencies."

Mobile frequencies for 450-460 mc. band

In finalizing its rule-making proceeding in Docket No. 10554 the FCC has further broken down the frequency allocations in the 450-460 mc. band so that one-half of the frequencies for the industrial, land transportation, and public safety radio services are to be available for mobile radio stations only and one-half will be available for both mobile and base operations. Up to this time the industrial services have had no frequencies reserved exclusively for mobile units.

Copies of the complete order in this docket may be had upon request to Joseph E. Keller, Special Representative of the Central Committee on Radio Facilities of the API.

Recent FCC authorizations

Public Service Co. of North Carolina Inc., Gastonia, N. C., for one base station at Mooreville on 48.98 mc.

Panhandle Eastern Pipe Line Co., Kansas City, Mo., for one base station at Lee's Summit on 48.70 mc.

Hope Natural Gas Co., Pittsburgh, for one base station near West Union, W. Va., on 48.70 mc.

United Gas Pipe Line Co., Shreveport, for two base stations at San Antonio, Texas and at Patterson, La., on 49.78 mc.

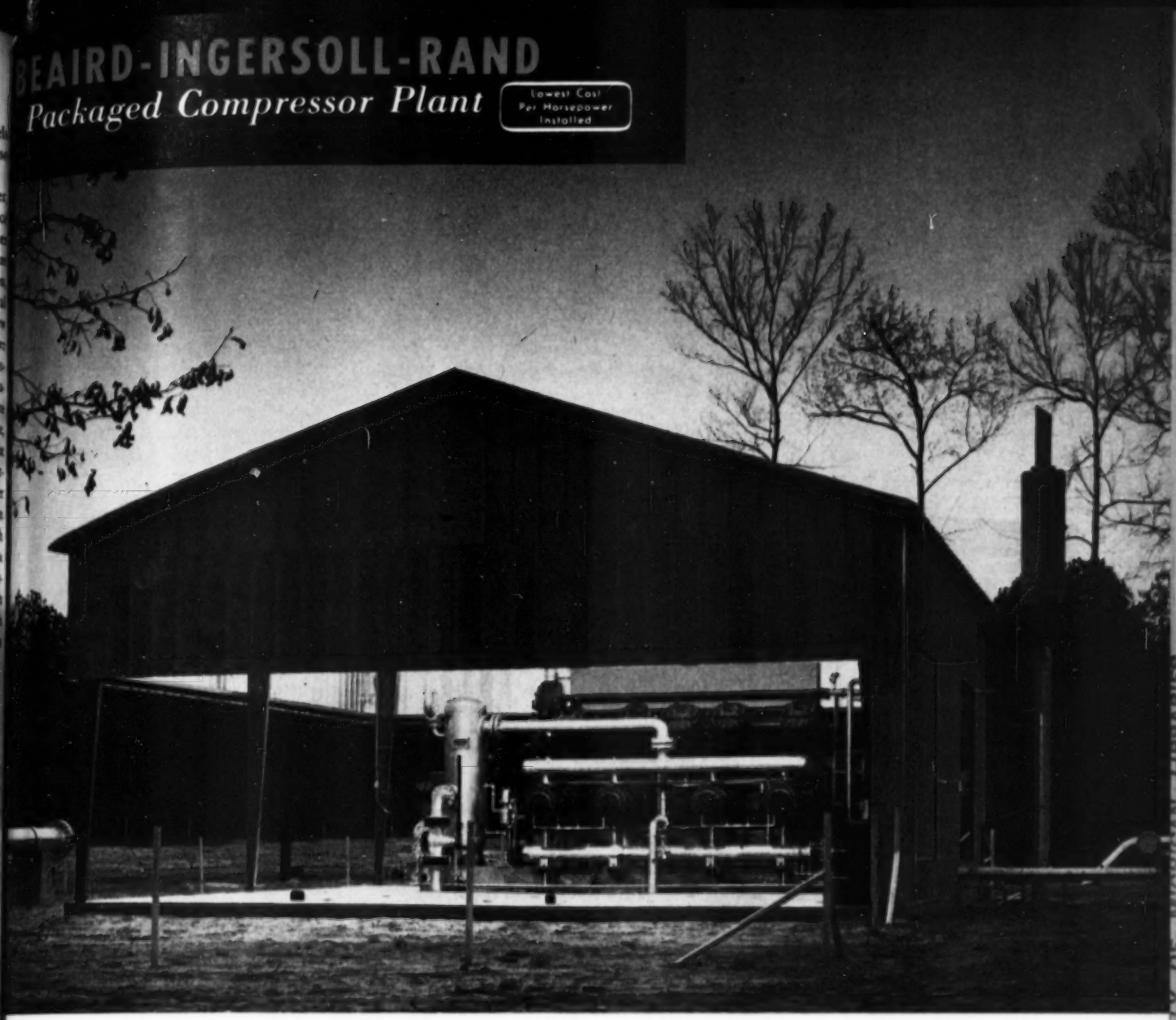
United Gas Pipe Line Co., Shreveport, for one base station at Pettus, Texas, on 48.7 mc., and for two operational fixed units at Oayla on 1875 mc.

Stonewall Gas Products Co. Inc., Dallas for three base stations at Aspermont, O'Brien, and Knox City and for eight mobile units on 153.35 mc.

United Gas Pipe Line Co., Shreveport, La., for one base station at Bourg on 48.7 mc.

BEAIRD-INGERSOLL-RAND
Packaged Compressor Plant

Lowest Cost Per Horsepower Installed



This packaged compressor plant is complete with Ingersoll-Rand gas engine driven compressor, Young radiator and all necessary equipment and controls. Sizes from 110 h.p. to 550 h.p.

NATURAL GAS & OIL COMPANY has a compressor station in Sligo Field, Louisiana, which is planned for maximum use of compressor horsepower throughout the life of the wells it serves. To boost gas from low pressure wells into gathering lines the company recently installed one single-stage 550 horsepower Beaird-Ingersoll-Rand packaged compressor plant. In the future, as well head pressures fall, a second 550 horsepower unit may be installed in space already provided in the same building. Later, both compressor plants may be easily converted to two-stage units. And finally, as the well is nearing depletion, one of the compressor plants may be transferred as a complete package to another site, leaving the remaining plant to complete production.

Let us show you the economy of using Beaird-Ingersoll-Rand packaged compressor plants for gas production.

Boosts field gas —

HOW ONE PRODUCER PLANNED A FLEXIBLE COMPRESSOR STATION

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

SINCE 1918 BEAIRD SHREVEPORT

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

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THE MEN
WHO SELL IT — *Another reason why*
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the Coal Tar
Protection in
Handy Tape Form

The service behind TAPECOAT is as distinctive as this coal tar coating, itself.

To make this service as dependable as the product, the sales engineer who sells the job also services it. This means that you can count on everything he tells you because he is responsible for the job *personally*.

The fact is, TAPECOAT gives you more lasting protection for your money because it is a quality coal tar product, and coal tar is nature's own defense against corrosion.

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TAPECOAT comes in rolls of 2", 3", 4", 6", 18" and 24" widths. It's easy to apply as our sales engineers will demonstrate.

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Originators of Coal Tar Tape Protection

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Pipeline News

Trans-Canada line okayed by Alberta government

The Alberta government approved on May 13 a permit for Trans-Canada Pipe Lines Ltd. to export natural gas from Alberta to eastern Canada and the Minneapolis area. The permit gives Trans-Canada 4350 billion cu ft of gas over a 20-year period and a maximum of 540 MMcf daily.

Another development in Ottawa was the approval by the Board of Transport Commissioners of Trans-Canada's plan to build the 80-mile line from Niagara to Toronto.

On behalf of the province of Ontario, a three-man fuel board has been appointed with full control of all fuels except Hydro. The board, composed of A. R. Crozier, T. H. Simpson, and L. R. MacTavish, will have full authority over the granting of distribution franchises to municipalities and to arbitrate disputes over rates.

Still another development was the appointment of Canadian-Bechtel to manage construction of the 80-mile Niagara-Toronto line.

The question of 30- or 36-in. pipe has still not been decided but it is believed that if a 36-in. line were built, it might be possible to divert some gas to New York state.

Pulsation research report made at SGA convention

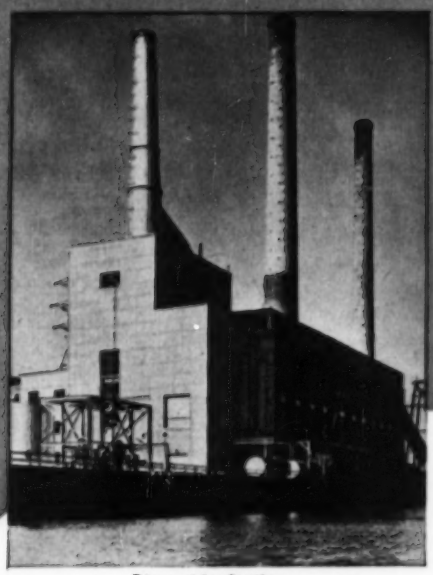
A report on the work of the Southern Gas Association pulsation research committee was given for the first time at the association's 46th annual meeting in Houston on April 26-28. This project, the first of its kind ever undertaken by the association, is being done in conjunction with the physics department of the Southwest Research Institute in San Antonio, Texas.

One of the principal objectives of the project is the development of an analog computer to simulate the pulsation at any particular point in the compressor station piping. The computer, in its present state of development, was demonstrated at a transmission section meeting during the convention.

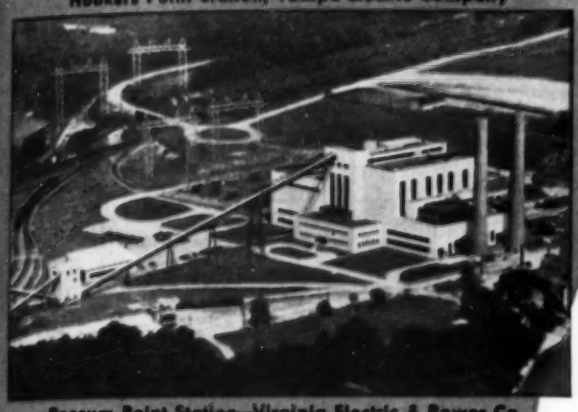
The computer makes use of plug-in electrical components to simulate various sections of the compressor station piping. The pulsating action of the compressor engine proper is simulated by an oscillator and associated wave-shaping circuits. The amplitude and shape of the pulsation pattern at any point in the analogous representation of the compressor station piping may be studied on an oscillograph screen by making a test lead connection to the point under study.

The extent to which the computer provides an analogous representation of pulsation found in an actual compressor station is studied with the use of magnetic record-

Hookers Point Station, Tampa Electric Company



Riverside Station,
Savannah Electric & Power Company



Possum Point Station, Virginia Electric & Power Co.

Louisiana Station, Gulf States Utilities Company

Designed & Constructed
by
Stone & Webster
Engineering Corporation
and using

MODERN OIC VALVES

OIC Valves are *precision engineered* and *precision built*. OIC engineers offer you *precision application* help.

Venice No. 2 Plant, Union Electric Power Company

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The analog computer for the study of pulsation in gas line compressor stations was demonstrated at a transmission section meeting by E. N. Henderson (left), Arkansas Louisiana Gas Co., chairman of the Southern Gas Association pulsation research council, and Dr. Paul M. Erlandson (center), chairman of the physics department, Southwest Research Institute. Oliver W. Clark (right), chairman of the transmission section, opened the meeting. Plug-in electronic components on the left panel are designed to simulate compressor station inlet piping and similar units on the right panel are designed to simulate outlet piping. The center section of the unit is designed to simulate the compressor engine and to study pulsation pattern at various points throughout the circuit.

ing equipment. Using a sensitive pick-up device, a recording of the pulsation at any particular point in an actual compressor station is recorded on one track of an ordinary two-channel magnetic tape recorder. A recording of the pulsation pattern present at the same point in the analogous representation of the same compressor station is recorded on the other track. The two tracks are then studied simultaneously on a dual-trace oscillograph to determine the similarity between the analogous representation and the pulsation found in the actual compressor station.

Because of the importance of the pulsation study it is being continued through the coming year during which time it is expected that additional work will result in electrical circuits that will more nearly simulate pulsation in actual compressor station piping.

The association's practice of informality as evidenced in its highly successful program of roundtable discussions throughout the year was also used to advantage in transmission section meetings. One of these panel discussions, moderated by H. F. Steen, El Paso Natural Gas Co., held in a living room atmosphere complete with coffee tables, sofas and table lamps, discussed such technical matters as vapor phase cooling, the use of additives in compressor engine lubricants, and rights-of way problems.

A report on the status of atomic power for industry was given at one of the transmission sessions by R. B. Briggs of Oak Ridge National Laboratory. He pointed to the development of power generation by atomic fuel and indicated that the chief problem at this point is that of cost.

The transmission section meetings were presided over by Section Chairman O. W. Clark of the Southern Natural Gas Co.

Panhandle to increase daily capacity by 50%

Daily sales capacity will be increased almost 50% to 1425 MMcf by Panhandle Eastern Pipe Line Co., Kansas City, Mo., according to its recently filed application with the FPC.

The expansion program, estimated to cost approximately $67 million, will be ready for operation by the end of next year. Chairman W. G. Maguire says that his company has been assured of sufficient demand to absorb the increased amount of gas the new facilities will provide.

About 255 MMcf of the new system capacity will come from added pipeline and compressor facilities and another 200 MMcf will be provided by a storage field now being evplored near Waverly, Ill.

A favorable condition of the recent FPC decision regarding Panhandle (see May GAS, page 27), according to Mr. Maguire is that it will enable the company to charge for the gas from its own reserves the average price that other producers get for gas from the same fields. It will also permit Panhandle to retain profits from gasoline extraction.

However, it is indicated that the company will have to seek a further increase in rates because of increases in operating costs and in the cost of purchased gas over the past two years, as well as higher operating costs that will result from the new expansion program.

MidSouth enters into novel service agreement

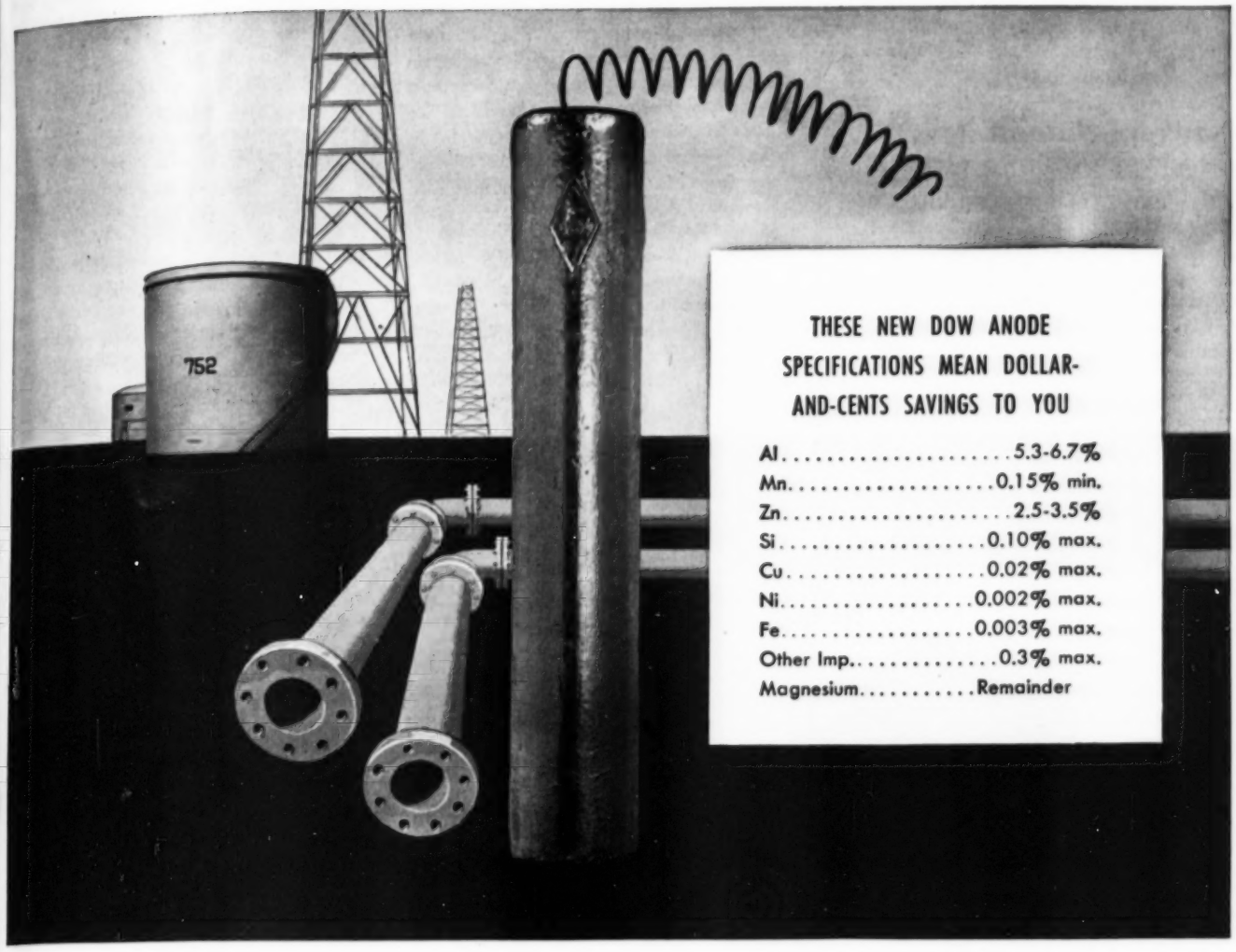
Though applications filed with the Arkansas state public service commission last month, the MidSouth Gas Co., Little Rock, and eight east Arkansas municipalities asked permission to enter into an agreement whereby the cities would build pipelines and distribution systems and lease them to the company for 20 years.

Involved in eight separate applications filed would be 68.5 miles of line and $949,400 in installations. One line, 20.7 miles, would extend from Marion to Parkin, Earle, and Crawfordsville. The other, 47.8 miles, would extend from Marion to Tyronza, Lepanto, Turrell, Marked Tree, and Trumann.

According to the application, the company and municipalities propose to enter into an agreement whereby MidSouth would act as

A living room atmosphere complete with table lamps and coffee tables was provided for the informal panel discussion on natural gas transmission moderated by H. F. Steen (right), El Paso Natural Gas Co. The session was opened by O. W. Clark, (left), Southern Natural Gas Co., chairman of the transmission section.

DOW



New high purity Dow Magnesium Anodes give you more hours of cathodic protection per dollar than any previously available

Cost of cathodic protection is now sharply reduced, thanks to new *high purity* Dow magnesium anodes. Because common impurities that cut efficiency have been greatly diminished, the new Dow anodes last far longer and give you more ampere hours of protection.

That means less frequent replacement—major savings in labor as well as in the anodes themselves.

Dow's new specifications for *high purity* magnesium anodes result from some 1,200 individual anode efficiency tests, covering more than 120 batches of magnesium alloy. Ample field testing, under varied conditions, has proved the findings of the Dow magnesium laboratories.

Now available in the complete range of shapes and sizes of cast anodes, the new *high purity* anodes represent another important step in Dow's continuing program of magnesium research and development.

If you have an underground corrosion problem, Dow magnesium anodes offer the truly dependable solution—unaffected by power line failure or dried-up ground beds. Phone your nearest Dow sales office or distributor of Dow anodes for full details. THE DOW CHEMICAL COMPANY, Midland, Michigan, MA 314L-1.

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agent for them in procuring materials and constructing the lines and distribution systems. The cities would then lease the lines and systems to the company for operation for 20 years, after which time MidSouth would have option to purchase.

Northern Natural steps into North Dakota picture

In a surprise move, Northern Natural Gas Co., Omaha, has bid for permission to construct a $15 million North Dakota natural gas pipeline. In filing a brief with the North Dakota PSC opposing the pipeline application of North Dakota Natural Gas Co., Northern Natural argued that North Dakota Natural had failed to make a case and offered to build a substitute line.

Northern Natural's plan would hinge upon obtaining gas from Canada, upon the failure of North Dakota Natural to obtain a certificate from the commission, and subsequent cancellation of the contract North Dakota has with Amerada Petroleum Corp. to buy natural gas from Beaver Lodge and Tioga fields. Northern Natural was one of several unsuccessful bidders for the gas before Amerada signed with North Dakota.

Northern Natural's brief said: "If the urgencies of the . . . situation in North Dakota are such that the only reasonable solution to the present problem is the immediate construction of a pipeline this year, Northern Natural Gas Co. would be willing to build a 24-in. line from the Tioga field to the Grand Forks-Fargo area this year."

Saying that "it had been prepared" to build a 500-mile 24- or 30-in. line connecting the Willison basin to its 1.1-billion-cu-ft per day system "whenever an adequate supply of gas is developed in the basin," Northern Natural added that "the 30 MMcf now available would not be adequate to support such an investment, which approximates $30 million."

The brief said, however, that "We have in mind the prospect of changing the routing of our proposed pipeline out of Canada to move the point of delivery from a point south of Winnipeg to the border north of the Tioga field.

"Northern Natural would then propose to build the 500-mile 24- or 30-in. line across North Dakota from the Tioga gas field past Minto to Fargo and from there eastward to the Twin Cities.

"Northern Natural Gas Co. would be willing to construct any reasonable branch lines from such mainline to serve North Dakota cities and towns including Grand Forks."

State PSC Commissioner Ernest Nelson, who presided at the North Dakota Natural hearings, said the brief would be taken under advisement but the commission's order in the case would have to be based upon evidence and Northern Natural had entered no evidence.

Montana-Dakota named in common carrier suit

Industrial Gas Co. and Mondakota Gas Co., both of Billings, Mont., have filed a suit in the U. S. district Court in Bismarck, N. D., seeking to declare Montana-Dakota Utilities Co.'s pipeline from Wyoming-Montana to North Dakota a common carrier.

As the result of an amendment to the Mineral Leasing Act in 1953, Montana-Dakota field a proposal with the FPC to cancel its tariff and notified the plaintiffs that it would continue to transport gas under existing service agreements, but enter into no new agreements. The amendment relieves the common carrier obligation of the Mineral Leasing Act to pipelines crossing federal land. Montana-Dakota contends that it qualifies since it is subject to regulation under the Natural Gas Act and since it is also subject to state regulatory agencies.

The plaintiffs contend the amendment does not apply to existing pipelines but to lines laid before passage of the act, and ask that Montana-Dakota be compelled to accept two new applications for service agreements.

Sixty-year gas reserve uncovered in Pakistan

Gas reserves, estimated at 2280 billion cu ft, enough to supply 100 MMcf of gas per day for 60 years, have been uncovered in Sui, in the Baluchistan desert in Pakistan.

The new discovery is expected to set off a chain of industrial development in the

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TYPE UG-1
WmSON PIG sizes 12"-18" with 80-lb. Springs

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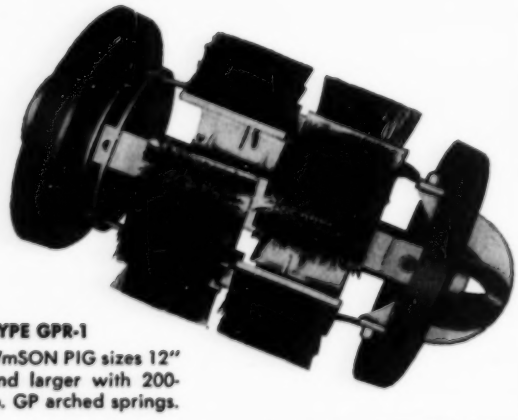

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Crude Oil Line, SOMASTIC Coated, Was Lowered from Old Position

...HERE'S PROOF!

Crude Oil Line Uncovered After 11 Years ... The 10¾" SOMASTIC Coated pipe line shown at the left had been underground in irrigated sandy loam, generally corrosive, for over 11 years when housing developments required that it be uncovered and lowered. Inspection of the line revealed *no deterioration* and *no repairs were required*. In fact, the line was in such good condition that it was never raised above ground. Note in the picture how trenching operation permitted line to be moved to the right, out of its former position, and lowered to its new position.

...AND MORE PROOF!

Natural Gas Line Uncovered After 11 Years ... The close-up of the 8⅝" SOMASTIC Coated pipe at the right is typical of the natural gas line uncovered after 11 years underground in alkali uncultivated soil under a dry lake bottom. Note the *lack of damage!* Any physical or chemical changes that had occurred were so slight that *normal handling* methods were employed and the pipe re-used.

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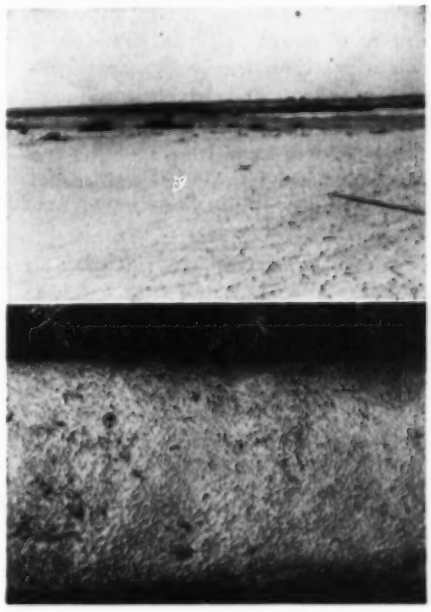
SOMASTIC Pipe Coating is *thick*. There are fewer pits under thick coatings. It is *seamless*. There are no holidays because of overlapping layers, or bubbles. It is *reinforced*. The reinforcement is permanent and uniform. It is *rigid yet elastic*. Withstands depression over long periods, absorbs pipe movement and changes in pipeline temperature. And finally... SOMASTIC Pipe Coating is *proven under adverse soil conditions for more than 23 years.*

Natural Gas Line, SOMASTIC Coated, Was in Excellent Condition after 11 Years under Dry Lake Bottom.



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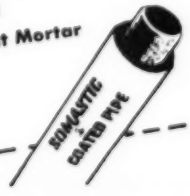

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country: it would make the country self-sufficient in power supplies, eliminate the costly importation of coal, transform industrial and domestic fuel and heating practices, effect great savings in foreign exchange, and stimulate new industries.

Tenders have been received from the United States, Britain, Holland, and France for a 350-mile pipeline to be laid from Sui to Karachi, the capital, at an estimated cost of $25 million. The line would supply three power stations at Hyderabad, Kotri and Karachi, and three cement plants at Rohri, Hyderabad and Karachi. It will also enable the government to fulfil a plan for a nitrogenous fertilizer plant.

Pakistan's annual fuel requirements are estimated at about 2 million tons of coal.

Pennsylvania-Jersey line receives FPC approval

Texas Eastern Penn-Jersey Transmission Corp., a subsidiary of Texas Eastern Transmission Corp., both of Shreveport, has received FPC approval of its proposed 265-mile, 24-in. gas line, which will start at the Oakford storage field in Pennsylvania and extend to a connection with is parent's lines near Lambertville, N. J.

Concurrently, the commission issued a certificate to the parent company authorizing it to operate the new line, to perform a storage service for Transcontinental Gas Pipe Line Corp., Houston, and to increase maximum daily deliveries to certain TET customers. Transco was, in turn, authorized to increase maximum daily deliveries to seven of its customers in the New York, New Jersey, and Philadelphia areas under the storage arrangement.

Texas Eastern Penn-Jersey's project will cost an estimated $30,755,200 and in addition to the line will include a 3300-hp compressor station.

Texas Eastern, which will not construct any new facilities, will loan up to 136,174,000 cu ft of gas per day to Transcontinental from Nov. 16 through April 15 each year, and will receive back from Transco during the other months of the year a quantity of gas equal to that loaned.

Transco will build connecting facilities with Texas Eastern in Montgomery county, Pa. and near Linden, N. J., at an estimated cost of $161,628.

Union Gas of Canada to get additional U. S. gas

An agreement has been signed for the importation of 15½ billion cu ft of natural gas from the United States annually, according to the Union Gas Co. of Chatham, Ont., Canada. This is in addition to the 5½ billion presently being imported each year.

Company officials said the Panhandle Eastern Pipe Line Co., Kansas City, Mo., has concluded a 20-year contract to supply the natural gas that would be distributed to southwestern Ontario centers once an FPC permit is granted.

A provision in the agreement permits the Canadian company to discontinue importation from the United States when gas from Alberta arrives via the proposed Trans-Canada line.

Underground prospects bright, says Northern

Results have been encouraging and the outlook is optimistic, according to Northern Natural Gas Co., Omaha, in its search for formations suitable for the underground storage of natural gas.

The most favorable area found to date by the company is in west central Iowa, near the town of Redfield in Dallas county. Northern drilled 33 shallow test holes near Redfield that indicated a satisfactory dome-type structure existing in deep formations. The findings of a seismograph crew further substantiated drilling results and a deep test well has been spudded for the purpose of obtaining core samples from the location believed to be the highest point in the underground structure.

Northern believes the Dallas county area may provide an underground reservoir that will store approximately 50 billion cu ft of gas. If this is found to be true, the maximum daily winter output is estimated to be 200 MMcf. The company will then submit an application to the FPC for a construction permit. If progress develops satisfactorily, the storage area could be in operation by the summer of 1955.

Petrochemical industry attracting gas companies

Mississippi River Fuel Corp., St. Louis, has announced plans to construct a 200-ton per day ammonia plant to produce anhydrous ammonia, nitric acid, and ammonium nittrate as its first step in the pertochemical business.

Daily output of the plant will be 330 tons of fertilizer, using natural gas, water, and air as the raw materials. The natural gas intake will be approximately 10 to 12 MMcf per day.

Another company exploring the possibilities of petrochemicals is Equitable Gas Co. of Pittsburgh. It is expected that a final decision will be made this year as to whether or not the company will construct a combination natural gas stripping and chemical plant somewhere along the Ohio river in the Ashland, Ky. area.

A subsidiary of Equitable, the Kentucky-West Virginia Gas Co., recently was issued a certificate of necessity by the government, which would permit 5-year amortization, for tax purposes, of 65% of $8,449,000 covering part of the cost of new facilities to process natural gas into natural gasoline, liquid petroleum gas products, and ethane.

Several states studying severance tax situation

Current and prospective developments with respect to the imposition of severance and other taxes against gas include the following:

Arizona: A bill failed to pass that would have imposed a 5% severance tax on persons engaged in mining and the extraction of natural resources from the soil.

Colorado: It has been indicated that the constitutionality of the state's oil and gas severance tax would be challenged in court by the California Co., which made a quarterly tax payment of $238,350.67 on its 1953 production "under protest" and made a formal claim for a full refund. If the refund is denied, the company will bring suit. Involved will be some $2 to $3 million in annual state revenue.

Louisiana: Despite budget recommendations by Governor Kennon contemplating "no increase in current tax rates," one of the early bills introduced in the Louisiana legislature last month called for an increase in the natural gas serverance tax from three-tenths of a cent per Mcf to two and three-tenths cents. The representatives who sponsored the proposal said it would increase the yield from $4 million a year to more than $24 million.

Oklahoma Supreme Court upholds wellhead price

The Oklahoma Supreme Court upheld an order of the Oklahoma Corporation Commission of last December fixing a higher price for natural gas in the Guymon section of the three-state Huguton field.

The order fixed a wellhead price of 9.8262 cents per Mcf, the second such order the commission has ever issued. The order was opposed and appealed by Natural Gas Pipeline Co. of America, Michigan-Wisconsin Pipe Line Co., and Panhandle Eastern Pipe Line Co.

Nearly $22½ million in rate boosts asked

A total of nearly $22½ million in proposed wholesale natural gas rate increases has been filed with the FPC by six pipeline companies, all of which have had other increases made effective within the past few months.

The largest of the newly proposed increases is by Tennessee Gas Transmission Co., Houston, which filed a $13.6 million, or 10.3%, annual increase. Four customer companies, in turn, filed increases intended primarily to pass along TGT's increase.

The sixth filing, which is not related to TGT's, was by Transcontinental Gas Pipe Line Co., Houston, which is proposing a $5,658,000 increase.

The customer companies of Tennessee filing proposed increases are Hope Natural

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Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

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Gas Co., Clarksburg, W. Va., $2,175,000; Tennessee Natural Gas Lines Inc., Nashville, $290,000; Alabama-Tennessee Natural Gas Co., Florence, Ala., $106,000; East Tennessee Natural Gas Co., Knoxville, $654,000.

In other actions, the FPC suspended about $9.5 million of a proposed $12,589,000 increase filed by Cities Service Gas Co., Oklahoma City; approved terms of a settlement reducing from $2,629,000 to $906,000 per year the amount of an increase proposed by United Fuel Gas Co., Charleston, W. Va.; and made effective a suspended $3,676,000 boost by Hope Natural Gas subject to the refund of any amounts subsequently disallowed.

Exploration subsidiary formed by Peoples Gas

Peoples Gas Light & Coke Co., Chicago, has formed a new subsidiary, Peoples Production Co., to enter into an exploration and development contract with Sinclair Oil Co., Standard (Ohio) Oil Co., and El Paso Natural Gas Co. These four companies will invest some $30 million in the exploration for and development of oil and gas fields in the offshore area of the tidelands adjacent to the Louisiana and Texas Gulf coast.

Peoples Gas will provide Peoples Production with $8 million, which will be used to finance Peoples Gas share of the offshore exploration and to pay the expenses of the production company until it develops an earning power. A credit agreement has been entered into with five Chicago banks under which $8 million may be borrowed to initially finance the investment.

In making the announcement, James F. Oates Jr, company chairman, said that "the venture is, of course, speculative and the four parties may fail in their effort to obtain valuable oil and gas reserves." However, he continued, "It is obvious that the Peoples Gas enterprise is in a sounder position if it succeeds in discovering and obtaining its own reserves. We thereby avoid the uneasy position of being dependent upon the reserves of others . . ."

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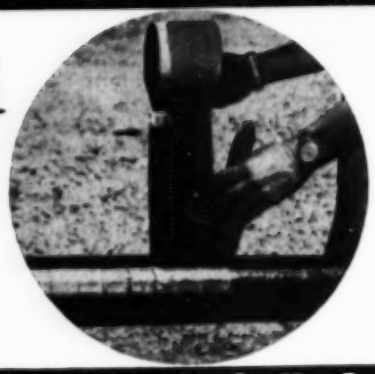
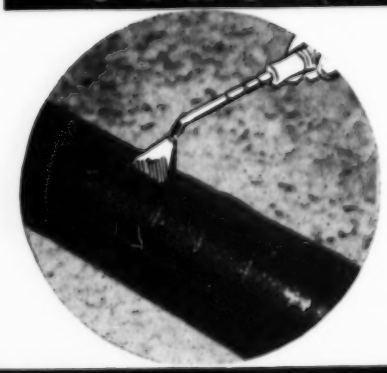
An open mesh glass fabric for use when you have your own heated dope ready and available. Glasfab is impregnated with a hydrocarbon thermoplastic compound which makes it compatible with both coal-tar and asphalt bitumens. Midwestern's Glasfab is perfectly suited for coating tank bottoms, reinforcing roofing bitumens, and for emergency pipeline repairing. Widths up to and including 36" wide available.

GLASTAPE



The perfect pipeline emergency repair material. Midwestern Glastape contains its own coal tar enamel and eliminates the mess and bother of carrying heated dope or heating equipment to the scene of the trouble. Glastape is applied with a special liquid adhesive which is "painted" onto the wrap as it is applied to the pipe. The bond is permanent, corrosion resistant. Supplied in rolls from 2" to 24" in width.

GLASKOTE



Midwestern Glaskote is a specially designed heat applied handwrap for joints, couplings and short lengths of pipe. The material has a glass fabric base impregnated with a plasticized coal tar enamel. As Glaskote is wound onto the pipe it is flashed with a low temperature torch, melting the enamel right onto the pipe. Available in 2" to 24" widths. *Write for more information on any of the above.*

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El Paso exploring Utah area for gas reserves

Drilling is under way in the Peter's Point area of Utah, lying in mountainous terrain southeast of Salt Lake City, by El Paso Natural Gas Co. to prove whether or not the area has gas reserves necessary to justify pipeline operations. The company is also drilling in a southwestern Wyoming area.

With the slowing of drilling activity in the San Juan basin, El Paso geologists in the area are moving into an exploratory phase. Field parties are sent out from the Salt Lake office to examine and map thousands of square miles of surrounding country, some of which will be mapped in detail for the first time.

The exploration department has crews working in west Texas, southeast New Mexico, the San Juan basin, and Nevada.

NGAA bestows Hanlon award on George P. Bunn

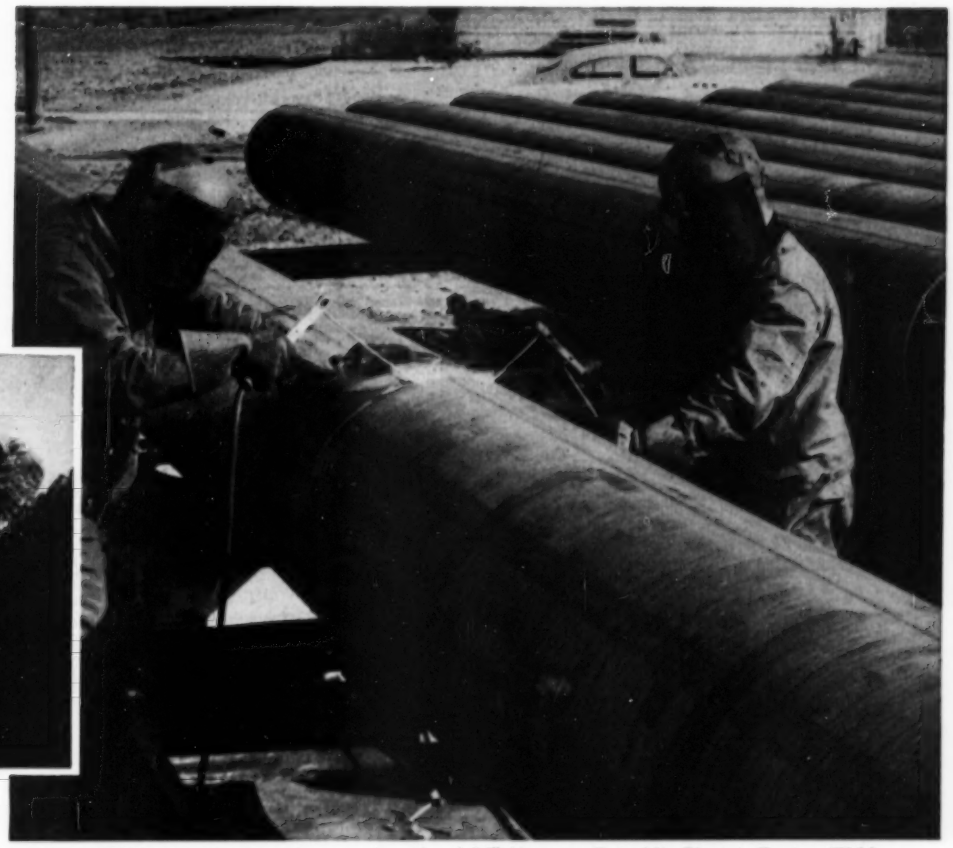
George P. Bunn, manager of the gasoline department of Phillips Petroleum Co., received the yearly Hanlon award of the Natural Gasoline Association of America during the first general session of the 33rd annual convention of the group held recently in Dallas.

Initial technical sessions included discussions of developments in product transportation, gas compression, the control of high pressure gas production, well and plant corrosion, and a report on pipeline construction in the tidelands by Robert C. Ledford, Marine Gathering Co., Houston.

Topics of other technical papers were design of pipelines for the simultaneous or two-phase flow of oil and gas, description of the method of detecting compressor breakdowns in advance of the event, and problems associated with high pressure gas production.

Also covered were corrosion of heat exchangers in glycol-anine treating plants, the economics of modern dehydration, and operating experiences with amine units for H_2S removal.

All of the officers who served during the



Crews find that the uniformity of Republic Electric Resistance Weld Pipe makes for rapid welding.

Welders tacking together two lengths of 26" diameter Republic Electric Fusion Weld Line Pipe used in 65 mile line between Cleveland and Petersburg, Ohio. Finish welding will be done on a Fusion Weld field unit.

With Republic Line Pipe you can weld field joints *fast*

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The highly ductile, low carbon steel welds readily, too. High ductility assures smooth bends in the field or shop without severe wrinkling.

What makes Republic Line Pipe so easy to weld? Uniformity. Uniform flat rolled steel is formed into pipe of uniform circumference. Walls are uniform. Uniform yield strength means dependability in every inch of line.

Republic Electric Fusion Weld Line Pipe comes in sizes 24" through 30" O.D. Republic Electric Resistance Weld Line Pipe runs from 2⅜" through 16" O.D.; Republic Continuous Butt Weld Pipe from ⅛" through 4" nominal.

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1953-1954 term were reelected. They are: Frank M. Perry, Cities Service Oil Co., president; vice presidents: Robert Boykin, Fullerton Oil Co.; W. F. Matheny, Sid Richardson Gasoline Co.; George T. Tennison, Shell Oil Co.; and Albert H. Weil, United Gas Pipe Line Co.; and William F. Lowe, secretary-treasurer.

Hope Natural proposes storage and extension

Hope Natural Gas Co., Clarksburg, W. Va., has filed two applications with the FPC—one proposing to increase its natural gas storage area and the other proposing construction of an extension of a line into gas producing fields.

Hope proposes (Docket G-2412) to increase the capacity of its Kennedy storage pool in Lewis and Harrison counties, W. Va., by 10 billion cu ft to a total ultimate capacity of 30 billion. Estimated cost of the project is $1,571,396. Construction would include 19.9 miles of 6- to 16-in. gathering lines.

In its other application (Docket G-2413), a 22½-mile 12-in. extension is planned which would connect with an existing line in Boone county, W. Va., and extend across Logan county to a point near the Logan-Mingo county line. Estimated cost is $93[0]-000. The new line would be used to transpo[rt] Hope's own gas as well as gas purcha[sed] from others. In addition, the company wo[uld] receive gas belonging to Carnegie Natu[ral] Gas Co. for redelivery to that company [in] Marion and Wetzel counties, W. Va.

More gas from storage sought by Ohio Fuel Gas

A 24.5-mile, 20-in. line in Richland a[nd] Crawford counties, Ohio, has been propo[sed] by Ohio Fuel Gas Co., Columbus (Doc[ket] G-2408), which would enable the compa[ny] to transport additional gas from und[er]ground storage.

The $1,072,000 line would extend fr[om] the company's Weaver storage compres[sor] station and would provide an outlet for i[n]creased volumes of gas to be available fr[om] the presently operated Weaver and Hol[mes] storage areas now under development a[nd] would deliver available gas into existing [or] planned market trunklines for service [to] major market areas in northwestern Ohio.

The proposed facilities would have a [ca]pacity to transport from 100 MMcf to [150] MMcf per day for delivery into an existi[ng] line in Crawford county, the company sa[id]. Northwestern Ohio market areas to benefi[t] Toledo, Bowling Green, Bradner, New[ton] Baltimore, Fostoria, Findlay, Tiffin, Upp[er] Sandusky, and Bucyrus.

Northern Natural to serve Duluth and Superior

Northern Natural Gas Co., Omaha, [is] seeking FPC approval for construction of [a] line to serve Duluth, Minn., and Superi[or] Wis., next year.

The 167-mile line would cost an es[ti]mated $12,195,300 and would be built fr[om] Farmington, Minn., as the first step in th[e] firm's plan to provide gas service to oth[er] Minnesota Iron Range communities.

Kansas-Nebraska expanding to meet growing demands

Kansas-Nebraska Natural Gas Co., Phi[l]lipsburg, Kan., has applied to the FP[C] (Docket G-2392) for authorization to co[n]struct a total of 223 miles of line to a[d]d 2700 hp in compressor capacity to provi[de] additional capacity to meet growing natur[al] gas requirements on its system in central a[nd] northeastern Nebraska. The $4,096,890 pr[o]ject would consist of 6- and 12-in. line, [a] new 1500-hp station, and addition of 12[00] hp at an existing station.

The company also announced plans la[st] month to spend about $6 million to improv[e] and enlarge facilities to handle gas from th[e] West Sidney, Neb. field. The plans were di[s]closed after Ohio Oil Co. announced th[at] gas from the field would be available by th[e] latter part of the year.

Included in the plans is a project to ex[t]end service to Alliance, Neb. The compa[ny]

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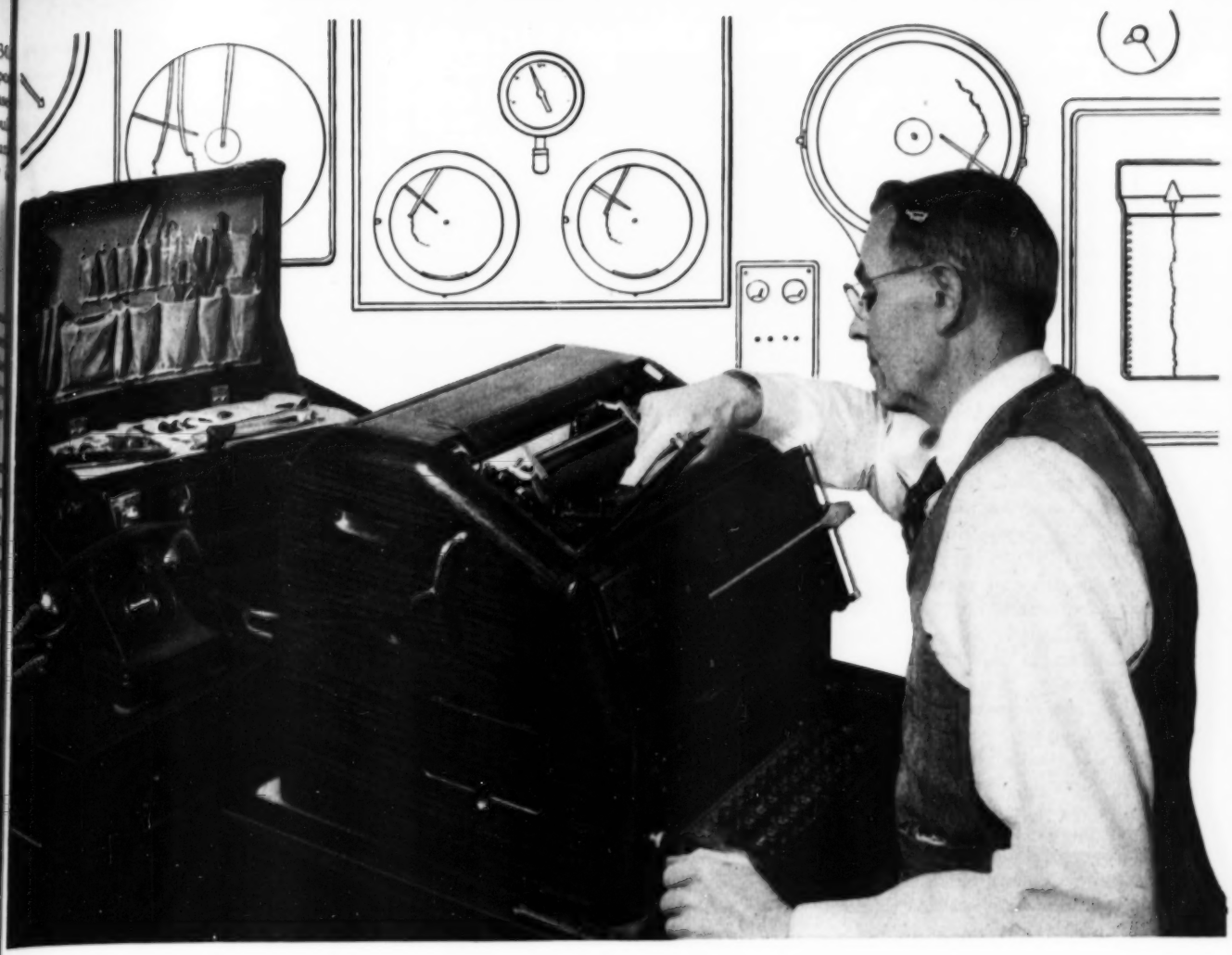

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Installation of communication equipment is just the beginning of your Bell System service.

Behind every piece of equipment stands an army of trained technicians. Their skills are the end product of Bell System's 78 years of communications experience.

The work of these specialists is one reason for our remarkable record of reliability in the pipeline field. From research through manufacturing, installation, operation and maintenance, Bell System people are on the job continually. They make sure that you get the finest communications service in the world.

Whether you need private-line telephone, mobile telephone or teletypewriter service, or channels for remote metering and supervisory control, get Bell System experts on *your* team.

• • •

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

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METERING CHANNELS

BELL TELEPHONE SYSTEM

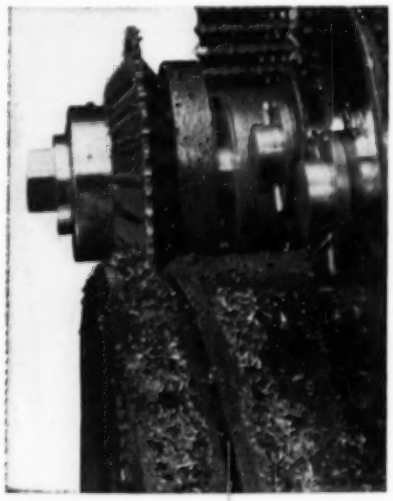
One weld takes place of two

THE 860-mile Gulf Interstate Gas Co. line, from the coast of Louisiana into West Virginia, uses a new welding system at all highway, railroad and river crossings where ⅜-in. wall X-52 pipe is joined to ½-in. wall X-52 pipe.

This new type of weld preparation eliminates the use of a "transition piece," allowing one weld to take the place of two, and permitting greater distance between welds in keeping with best welding practices. Field machining of the ½-in. wall pipe with the new inside beveling attachment for the Wachs National pipe saw makes this single-type weld possible.

One-half inch wall pipe was double- or triple-joint welded into lengths required for crossings. Test plugs were then welded on the ends and an 8-hour hydrostatic test was run on every crossing section. This necessitated cutting the test plugs off of the heavy wall pipe at completion of the hydrostatic tests. The saw, with a standard saw and external bevel cutter, was used. This cut and bevel were made in one operation. At the completion of this cut the new Wachs internal beveling attachment was placed on the basic saw unit and an internal bevel was machined to reduce the ½-in. pipe down to proper welding thickness for ⅜-in. wall pipe. This results in a "machine shop" bevel (inside and outside) ready for welding with no change in the physical properties of the pipe.

The internal bevel attachment is now "thinning down" the inside of the pipe to make a transition from ½-in. wall to ⅜-in. wall pipe.



Close-up view of external bevel cutter as it cuts and bevels the pipe.

The pipe saw cutting and beveling ½-in. wall, 30-in. diameter, X-52 pipe. Note that the test plug is being cut off of the end of the 30-in. road crossing pipe upon completion of the hydrostatic test.

also plans to build a new pressurizing station at North Platte and install a distribution system for Lodgepole.

Mexico plans export of natural gas reserves

Mexico's government-owned oil industry is drafting plans to make more use of natural gas, which comprises some 27% of the country's oil reserves.

Antonio Bermudez, head of the government Pemex Co., said in his annual report that his country's gas reserves are much greater than the domestic market needs so the company will look largely to export. He calculated gas reserves as equivalent to 6½ million bbls of oil.

Recent development of natural gas resources in the United States and construction of pipelines, the report said, make it feasible for Mexico to export more gas. Her larger gas fields are in the lower Rio Grande valley, within a reasonable distance of U. S. pipelines. International gas prices, he said, make it profitable for Mexico to invest more money in developing gas production.

An absorption plant, which will be able to treat 300 MMcf of gas per day, is planned in the Rio Grande fields around Reynosa.

First of 71 towns receives gas from Northern Natural

Eagle, Neb., became the first town to receive natural gas service among the 71 towns scheduled to be attached to Northern Natural Gas Co.'s transmission system this year. The company is building facilities to serve 50 new towns in Iowa, nine in Minnesota, eight in Nebraska, and four in South Dakota.

Service to these communities will increase the number served by Northern by 30% and will increase the total number of communities served to 307. It is estimated that the first full year annual sales to the 71 towns, which have a combined population of 275,000, will be approximately 22 billion cu ft.

Arkansas studies abolition of depletion allowance

Abolition of the 25% depletion allowance to gas and oil producers in computing their Arkansas state income tax will be studied by the Arkansas Legislative Tax Institute, an agency created by the State Legislative Council.

Similar to the 27½% depletion deduction granted oil producers on federal income tax computations, the Arkansas allowance has been in effect since 1947. Rep. Paul VanDalsem, who heads the tax institute, said that elimination of the allowance would boost state income tax revenues by $2 million annually, "at the very least."

Pipeline Notes

Trunkline Gas Co., Houston, has asked the FPC (Docket G-2402) for permission to build a new crossing of the Mississippi river. The crossing would be located just north of its existing crossing in the Greenville, Miss. area. Estimated to cost $2,960,000, the new facilities would include two 24-in. lines crossing the river, together with interconnecting lines to link the new crossing with the company's system. The application says that the new lines would be used simultaneously with the existing lines.

The FPC has amended its Uniform System of Accounts for Natural Gas Companies and its Annual Report Form No. 2, for Class A and B natural gas companies, to provide for accounting and reporting of federal income taxes resulting from accelerated amortization under Section 124A of the Internal Revenue Code. The first amendment provides for the addition of two new accounts: provision for deferred income taxes and credits to operations arising from federal income taxes deferred in prior years. The other amendment is the addition of a new account 295—reserve for deferred federal income taxes.

Hamer Valves Inc. is the new name of the Hamer Oil Tool Co., Long Beach, Calif. The change was made to more clearly identify the company with the products it manufactures.

H. C. Price Co., Bartlesville, Okla., has been awarded a contract by United Fuel Gas Co. for the construction of a 57-mile, 30-in. pipeline starting on the west bank of the Big Sandy river, south of Cattlettsburg, Ky., and extending in an easterly direction to a point about six miles northwest of Charleston, W. Va. In addition to the 30-in., Price will also construct multiple crossings of the Big Sandy and Kanahwa rivers. Natural gas will be delivered to United Fuel at the Big Sandy river by Gulf Interstate. Completion date for the United Fuel line has been set for Sept. 1.

American Car & Foundry Co., New York, has bought the W-K-M Co., of Houston, for a reported $7 million. The purchase of the company, which manufactures high pressure valves for pipeline and oil field equipment, is a further step in ACF's diversification program.

The Fred W. Phillips Supply & Manufacturing Co., Calgary, Alta., Canada, has been appointed as exclusive sales agent for Hamer line blind valves and nonstick plug valves in the Alberta province, according to Hamer Valves Inc., Long Beach, Calif.

Montana-Dakota Utilities Co., Minneapolis, asked the FPC (Docket G-2414) for authorization to construct about 49 miles of line and add 440 hp in compressor capacity on its transmission system in Montana and South Dakota. The $1,366,944 project would consist of about 34½ miles of 12¾-in. line paralleling a section of existing line from Baker-Glendive field in Montana to Rapid City, S. D.; 14.2 miles of 12¾-in. replacement line in Wyoming and Montana; and the additional horsepower for the Little Beaver station in Fallon county, Mont.

Treasure State Pipe Line Co., Great Falls, Mont., has applied to the FPC (Docket G-1982) for permission to increase its presently authorized exports of natural gas to Canada by 40 MMcf per year. By orders issued in 1952 and 1953 the commission had authorized the company to export a maximum of 80 MMcf of gas annually for use in Coutts and Milk River, Alta., Canada. The company states, however, that the Petroleum and Natural Gas Conservation Board of Alberta has indicated that it will not permit the installation of a gas system to supply Milk River unless an additional 40 MMcf is authorized for export.

Transcontinental Gas Pipe Line Corp., Houston, has the FPC's okay to construct a 19-mile, 12¾ in. line and to sell an existing 14-mile, 6-in. line in Vermilion parish, La., to enable it to take additional volumes of natural gas from the West White lake field (Docket G-2362). The new line will cost an estimated $1,042,310; the existing line will be sold to Union Oil Co. of California for $341,068. Transco has renegotiated its contract with Union Oil to increase the take from the field to a maximum of 41,464,000 cu ft daily.

Texas Gulf Producing Co., Houston, is building a $2 million natural gasoline plant in the Headlee field of Ector county, Texas. Engineered with provisions to expand output to 35 MMcf early in 1956, the plant initially will have capacity to process about 15 MMcf of gas daily. Plant processing will result in an initial output of about 14.3 MMcf of residue gas, which will be sold to a pipeline company. Expected recovery of liquids for sale will be about 1400 bbl a day of natural gasoline and liquid petroleum gases.

The Arkansas Louisiana Gas Co. has asked the Arkansas Public Service Commission for permission to lease a proposed gas distribution system to be built by the town of Murfreesboro, Ark. The company would have an option to buy the system at any time during the 20-year life of the lease.

The Kentucky legislature has enacted a bill to apply the law of condemnation to rights-of-way needed for underground storage of gas.

Olin Interstate Corp., New York, has received FPC authorization to acquire by merger and operate all the pipeline facili-

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HOT DOPE

Straight from the Kettle on PIPE PROTECTION

★

By Boyd Mayes

• Some feller with a big load of 4" broke down his long haul truck outside our establishment and we went out to see while he was waiting for help. We got to talking and it seems he was from the Piney Woods too, so we found one thing *real good* in common. He went on telling me the woes of long hauling and how he hated it and contractors too. Finally, I got around to asking him how long he had been at it and he said 15 years. "That's funny," I says: "If you hate it so how come you keep at it" He puzzled a minute and then said: "Well, you know there's lots of things *I hate worse.*" All of which goes to show how hard it is to find a man who don't like to talk. Now me, I like contracting—cause everyone I meet is my friend—some are old and some new—some are little in business, some are big . . . but they're all BIG to me. Sometimes they help me—maybe I help them. We all get along pretty well working . . . that's about all all of us do . . . work. Seems that it's not so much the money as the job we're in together—a job well done with friends. Guess that's what they mean when they say—*every call a pleasure.* Yes, I like the contracting business. Seems every day we meet up with old friends—new friends—old timers—new ideas—tried ideas—even some untried—but they all make the day interesting. It's been like that for 26 years—that's our record for working at the main job we know—coating, wrapping and reconditioning pipe. We're proud to offer the best of men and equipment to serve you.

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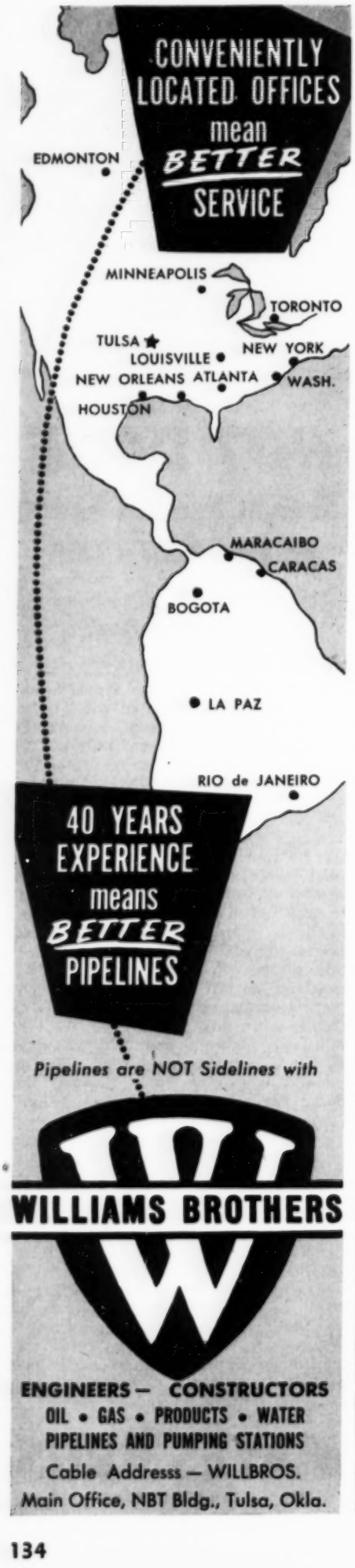


ties of Interstate Natural Gas Co., Monroe, La. The authorization, however, is conditioned to require Olin Interstate to record the acquisition of the pipeline company at net original cost and to prevent Olin Interstate's assumption of a $32 million debt incurred by it and its first parent, Olin Industries Inc., in acquiring Interstate's stock.

Shell Oil Co. has reported Arizona's first natural gas production in commercial quantities at the company's test site in northeastern Arizona. An initial output of some 2 MMcf daily is expected to increase to a flow with a minimum in excess of 3MMcf daily when present developmental work is completed. Shell also recently announced 3 MMcf of gas at its test well located on the Navajo reservation in northeast Arizona.

Texas' Governor Shivers has signed a bill that allows natural gas producers to sell fuel for irrigation pumps and other farm purposes without being regulated as gas utilities.

A decline in natural gas production "over the whole state" if new gas fields are not discovered has been predicted by Dr. Carlyle Gray, chief of the Pennsylvania state geologic survey. "Until the first of the year, the initial production from new wells averaged 8 MMcf daily," he said. "For the first quarter of 1954 the average yield from new wells has been only 3 MMcf." Natural gas reserves are steadily dwindling in the state, he said, and by 1955 they will fall below the rate of consumption unless new reserves are found.

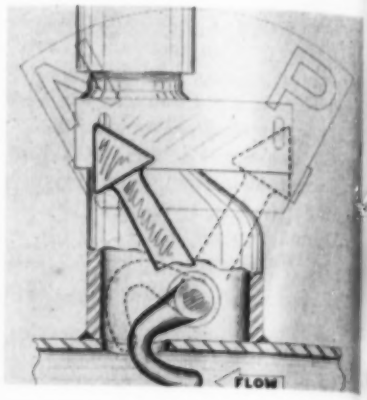
Total utility and pipeline gas sales to ultimate consumers totaled 5905 million therms in March, according to the AGA. Sales for the month were 4.0% higher than the 5680 million sold last March. Natural gas sales for the month aggregated 5534 million therms, a 4.0% rise over the 5322 million sold in March 1953. Manufactured and mixed gas sales totaled 370 million therms, a gain of 3.5% over the 358 million sold a year earlier.

Contract awards for future construction as carried in the Dodge Reports in April will set "one of the highest" records of any April in the 63-year history of F. W. Dodge Corp., it is reported. Even if the final tabulations for April failed to exceed last year's record-breaking total, it is clear that the boom in construction contract awards is continuing. January, February and March of this year have set new all-time highs for those months.

The American Chemical Society is now prepared to make grants for research in the petroleum field from the Petroleum Research fund set up some years ago for administration by the society. Grants will be made by the ACS's board of directors to persons recommended by a newly appointed Petroleum Research Fund Advisory Board.

New Products

For additional information on these products use coupons on p. 92.



13 Pig Signal

The T. D. Williamson Pig-Sig is a device to attach to pipelines larger than 4 in. to indicate the passage of the pipeline scraper. This signal is welded to the line and the trigger hole is tapped under pressure. A plug is then installed and the 2-in. tapping valve is removed—all without shutdown of the pipeline. Upon completion of the installation, the Pig-Sig can be equipped with a visual signal on either or both sides, an explosion-proof microswitch for hand reset, or similar switch and automatic reset.

The Pig-Sig, which positively indicates the arrival or departure of the pig, has a forged steel housing and cap with spark-proof trigger and indicator. The shaft and seal is a combination of O-ring and high temperature chevron packing, each of which will test well above normal pipeline pressures.

T. D. Williamson Inc.

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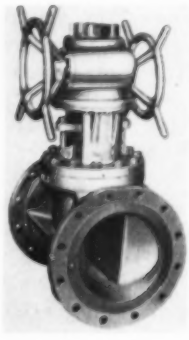
14 Plug Valves



Two new balanced-type plug valves, the Hamer 10-in. and 12-in. have been developed by Hamer Oil Tool Co. Currently being produced in ASA 150-lb and 300-lb classes, the new plug valves are available in carbon steel as well as other materials. Chain wheel attachments for overhead operation are available on both models.

The gland-packed valves are intended for refinery and general service involving high as well as low temperatures. Packings can be changed under pressure while the line is on stream. They can be operated with or without lubricant.

Two handwheels are provided: one turns the plug, thus opening and closing the valve

...e other raises and lowers the plug in its ...t, adjusting it to the proper fit into the ...dy seat.

...ner Oil Tool Co.

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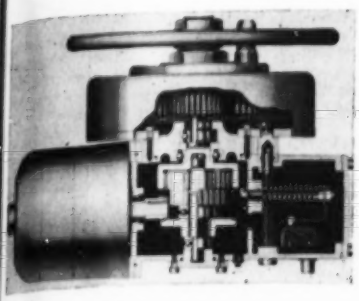

...5 Electric Valve Operator

Tork-Master electric valve operators are ...signed for operation of all types of con...entional gate, globe, plug, butterfly, and ...her valves in sizes from 2½ in. upward. Basic design provides for a wide range of ...erating speeds, output torque, and length ...f travel to accommodate various valve de...igns and operation conditions. Mounting ...ature provides for simple installation on ...alves in or out of service without altera...on of the valve.

The Tork-Master provides a means of ...perating valves through various electrical ...ontrol systems and may be timed with other ...quipment to function automatically. In the ...pening cycle, high efficiency gearing re...uires less motor power to "crack" the ...alve. In the closing cycle, power is cut off ...the precise moment that proper seating ...f the valve is attained.

...cBain Corp.

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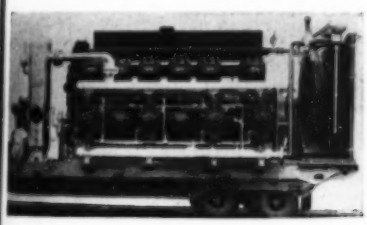

...6 Packaged Compressor

J. B. Beaird Co. is now producing a 660-...p packaged compressor plant, the largest ...er offered as a complete package. Built ...round the Ingersoll-Rand 12SVG gas-...ngine-driven compressor, the new packaged ...lant is designed for single- or multiple-unit ...stallation on gas pipelines, gathering lines, ...d gas-lift systems.

The entire unit is assembled on an integral ...bricated steel base. No more than a con...ete slab is required. Installation time and ...pense are reduced because of complete ...sembly in the factory. The 12SVG pack...ed compressor plant may be transported on

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Costing only a fraction of the price of bigger machines, mounted on Crane Carriers, Re-manufactured Trucks and Crane Carriers, or Crawlers, Bantams' 9 quick-change front end attachments have big work capacity - for profitable year-round operation. A Bantam is ideal for scattered assignments or crowded locations where bigger, heavier machines can't go.

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- Unloading pipe and materials
- Aligning pipe and fittings
- Excavating for leak repairs
- Uncovering lines for inspection
- Backfilling trenches
- Lifts up to 12,000 lbs. (truck mounted)

T-35 Bantam on All-New Crane Carrier Lifts 12,000 Lbs.

Bantam mounts on Crane Carriers, Re-manufactured trucks or your own trucks of suitable size. Also available on tracks - Crawler Bantam features 2-speed independent travel, has 16", 24" or 32" pads to go anywhere in any ground condition.

C-35 Bantam Crawler 3/8 Cu. Yd.

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heavy oil field trailers directly to location. Like other Beaird-Ingersoll-Rand packaged plants, the new model includes all necessary auxiliary equipment and controls.

J. B. Beaird Co.

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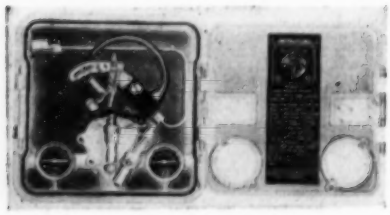

17 Pressure Controller

A new type 1440 pressure controller (non-recording) for sensitive pressure-vacuum control systems has been introduced by Black, Sivalls & Bryson.

The pressure controller is designed to handle both positive and negative pressures from high vacuum to pressures up to 10,000 lb. It is Bourdon-tube actuated with settings carefully calibrated, including vernier setting for fine adjustment.

Proportional band and on-off or maximum-minimum snap action adjustment is made without additional parts. Either action may be adjusted to pressures up to 75% of the limits of the Bourdon tube rating.

Black, Sivalls & Bryson Inc.

18 Shovel Dipper

An electrically operated shovel dipper trip is now available as optional equipment on Schield Bantam's line of truck and crawler-mounted ⅜-cu yd power shovels.

The operator can swing and dump without changing controls. A thumb-operated push-button switch is mounted on the swing clutch lever, which activates an electric motor mounted on the shovel boom. The motor, in turn, winds up a dipper chain, which trips the bucket dipper. Power is supplied from the basic unit battery through a solenoid arrangement connected to the dipper wind motor.

Greater dumping accuracy is made possible with the new device by mounting the control switch on the swing clutch lever.

Schield Bantam Co.

■

Progress Reports

NEW CONSTRUCTION PLANNED

ARKANSAS LOUISIANA GAS CO., Shreveport. Docket G-2307 for 136 miles of 6⅝- to 24-in. line in 12 sections, and 10,500-hp compressor station on its system in Arkansas, Louisiana and Texas.

HOPE NATURAL GAS CO., Clarksburg, W. Va. Docket G-2412 for 19.9 miles, 6- and 16-in. gathering lines to increase capacity of Kenna storage pool in Lewis and Harrison counties, W. Va.

HOPE NATURAL GAS CO., Clarksburg, W. Va. Docket G-2413 for a 22½-mile, 12-in. extension to existing line in Boone county, W. Va., to extend across Logan county to connect with producing wells.

KANSAS-NEBRASKA NATURAL GAS CO., Phillipsburg, Kan. Docket G-2392 for 223 miles of 6- to 12-in. line, a new 1500-hp compressor station, and 1200 hp additional at existing station to provide additional capacity on its system in central and northeastern Nebraska.

MONTANA-DAKOTA UTILITIES CO., Minneapolis. Docket G-2414 for 34½-mile, 12¾-in. line paralleling existing line from Baker-Glendive field in Montana to Rapid City, S. D.; 14 miles of 12¾-in. replacement line in Park county, Wyo. and Carbon county, Mont.; and 4 additional hp at existing Little Beaver compressor station in Fallon county, Mont.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2399 for a 167-mile 24-in. line to serve Duluth, Minn., and Superior, Wis. Also a 2000-hp compressor station in the Panhandle field.

OHIO FUEL GAS CO., Columbus. Docket G-240 for 24.5-mile, 20-in. line in Richland and Crawford counties, Ohio, to enable it to transport additional gas from underground storage.

TRUNKLINE GAS CO., Houston. Docket G-240 for two 24-in. Mississippi river crossings in the Greenville, Miss. area. Also interconnecting lines to link new crossing with company's system.

CURRENT CONSTRUCTION

EQUITABLE GAS CO., Pittsburgh. Docket G-213 to activate the Logansport storage field in the Big Injun Sand, Marion county, W. Va. Installation of a 1320-hp compressor station in Wetz

Keep jobs on Schedule with TULSA* WINCH...

To get equipment where it's needed, when it's needed, safely and efficiently, is no longer a major problem with contractors . . . they rely on Tulsa Winch to do the job. Whether you're moving power shovels or light timbers, there is a Tulsa Winch for every make and model of truck and crawler tractor in capacities from 6,500 to 80,000 lbs.

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*Reg. U. S. Pat. Off.

county remains to be completed in the spring.

GULF INTERSTATE GAS CO., Houston. Docket G-2058 to construct 860 miles of 30-in. line from Rayne, La. to Boyd county, Ky., 229 miles lateral lines and five 8000-hp compressor stations in four states. Mainline contracts let to H. C. Price and Houston Contracting Co. Lateral line contracts let to Anderson Bros., Associated Pipe Line Contractors and Williams Bros. Parkhill Truck Co. hauling pipe. Expect completion Nov. 1, 1954. Over 700 miles of 30-in. line completed. Work under way on 313 miles of gathering lines.

MISSOURI PUBLIC SERVICE CO., Warrensburg. Mid-States Construction Co. was scheduled to begin work May 15 on 25 miles of 10-line line from Warrensburg to Clinton.

OHIO FUEL GAS CO., Columbus. Docket G-2288 to construct 63 miles of 16- and 20-in. loop and replacement lines to insure service to existing markets. Work started May 5 by H. L. Gentry Construction Co. on 14.4 miles of 20-in. loop between Crawford and Mt. Sterling compressor stations.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-2101 to build about 200 miles of 34-in. mainline loops and 2500 hp in compressor capacity on line from Topock, Ariz. to a point near Milpitas, Calif.; and 7.2 miles of 30- and 34-in. and 1.9 miles of 22- and 24-in. line between Milpitas and Irvington, Calif. Pipeline work under contract to Engineers Ltd. Pipeline Co. Compressor under contract to Bechtel Corp. Entire job expected to be completed in 1954. Ninety-three miles of job in operation.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1907. About 250 miles various size line and 4400 hp compression remaining for construction in 1954 and 1955. Construction on 100 miles of 18-in. underway.

APPROVED

EL PASO (TEXAS) NATURAL GAS CO. Docket G-2371 for 13.3 miles of line, 1540 hp compression, purification and dehydration plant, and metering facilities in Lea county, N. M.

TEXAS EASTERN PENN-JERSEY CORP., Shreveport. Docket G-2341 to construct 265 miles of 24-in. line from Oakford storage field (Pa.) to Texas Eastern Transmission Co.'s Lambertville, N. J., compressor station; a 3300-hp compressor station near storage field.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston. Docket G-2362 for 19-mile, 12-in. line and abandonment of existing 14-mile, 6-in. line in Vermilion parish, La.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston. Docket G-2368 for 57 miles of line parallel to existing system in Louisiana, Mississippi, and Alabama.

CONTRACT LET

ATLANTIC SEABOARD CORP., Charleston, W. Va. Docket G-2286 for 116.6 miles of 26-in. line in five sections paralleling portions of existing system and addition of total of 4400 hp at two existing and one new compressor station. Western Pipe Line Constructors Inc. contracted for 45 miles of 26-in. from Clendenin to Walkersville, W. Va.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2063 (in part-second year program) for 204 miles of 24-, 26-, and 30-in. mainline additions to connect with Permian Basin Pipe Line Co. system, and 22,800 hp in new and existing stations in Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota, and Soutth Dakota. Midwestern Constructors Inc. contracted for 189 miles of 30-in. loops in Texas, Oklahoma, Kansas, Nebraska, Iowa, and Missouri. Parkhill Truck Co. doing hauling and stringing.

UNITED FUEL GAS CO. and CENTRAL KENTUCKY NATURAL GAS CO., Charleston, W. Va. Docket G-2285 for construction of a 4400-hp compressor station at its storage pool X-59 in Jackson county, W. Va. Also 59 miles of line and 6000-hp compressor station. Contract let to H. C. Price Co. for 57 miles of 30-in.

QUALITY C/W PIPE BUILDS SALES FOR *spi*

AERIAL VIEW OF STANDARD PIPEPROTECTION INC. PLANT

Standard Pipeprotection Inc. designed and built the first plant to include all the machines and methods and procedures necessary to set the highest standards, and to produce the finest coated and wrapped pipe.

Now, this quality c/w pipe is building sales for Spi . . . 1953 sales up 74% over 1952, up 107% over 1951. Here is proof of the industry's acceptance of quality c/w pipe.

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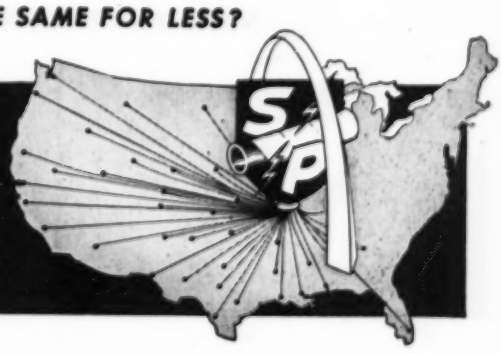

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Pipeline People

BUFORD BUTLER has been promoted to sales engineer for pipeline supplies and equipment in the mid-continent territory of the Midwestern Engine & Equipment Co., Tulsa. Mr. Butler has been with the firm as a field serviceman since 1950.

Buford Butler
Midwestern Engine

F. A. Weil
Blaw-Knox

FRANK A. WEIL has been appointed southern representative for Blaw-Knox Co.'s chemical plants and Buflovak equipment divisions. He will be located in the Birmingham offices and serve a five state area: Alabama, Florida, Georgia, Mississippi, and South Carolina.

The Worthington Corp., Harrison, N. J., has appointed three executives to new posts. E. J. TRIBBLE is assistant vice president in charge of manufacturing; A. M. TULLOY is works manager of the Harrison Works; and L. E. HAMMER succeeds him as works manager at Wellsville, N. Y.

H. A. DENNY has been named vice president and assistant general manager of the engineering and construction division of Koppers Co. Inc., Pittsburgh. Also named were A. B. FISHER JR., general superintendent of construction; GEORGE P. WILSON, production manager; and RICHARD W. VOLLMER, manager of the chemical and gas department.

GEORGE M. WALKER has been named vice president and general manager of Koppers Co.'s chemical division. He succeeds the late Dan M. Rugg.

PAUL B. KLUTHE has been named sales representative for the recently established Denver sales office of Kaiser Steel Corp.

Chiksan Co., Brea, Calif., has appointed ROBERT T. JONES as western regional sales manager, BEV P. RAGSDALE as senior field engineer, and H. J. SCHLARB as special representative in the sales department.

J. B. SAUNDERS JR., president of Triangle Refineries Inc., has been elected vice president of Texas Eastern Transmission Corp., Shreveport.

Recent changes in the pipeline department of Panhandle Eastern Pipe Line Co., Kansas City, Mo., include naming H. R.

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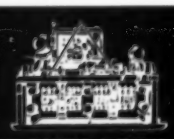
PIPELINE KETTLES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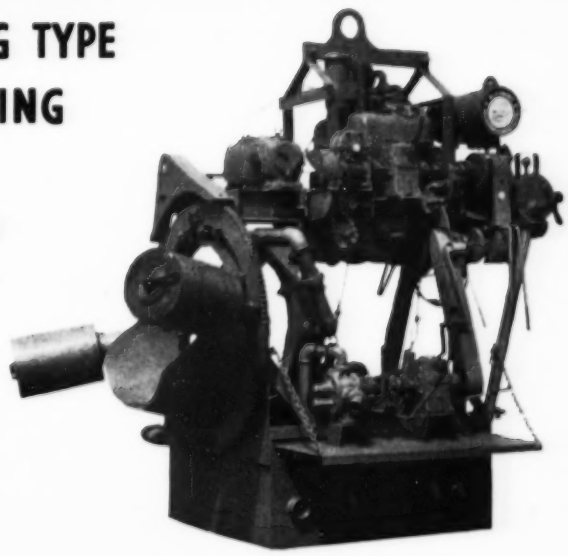

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GRAVES to the post of assistant central div
sion superintendent. GENTRY E. STOUT w
promoted to assistant district superintende
at Mexico, Mo.; GUY M. MCELFRESH is a
sistant superintendent at Delavan; LEITH
WOLFE is district superintendent at T
cola; and J. T. LEWIS is district superinte
dent at Mexico.

CHESTER F. SHORTAL has been nam
manager of the newly opened Kansas G
district sales office of J. F. Pritchard & C
of California. At the same time, W. L
ROEYER joined the company as manager
cooling tower and heat exchanger sales.

EDWARD J. DETGEN, general sales ma
ger of the Fiberglas general products di
sion, and WILLIAM M. KELLER, gener
factories manager of the Fiberglas text
products division, have been elected vi
presidents of Owens-Corning Fiberg
Corp.

Black, Sivall & Bryson's oilfield di
sion has made the following appointmen
LAWTON L. LAURENCE, manager of en
neering; LEE KELTON, manager of oilfi
sales; THOMAS E. POOL, Oklahoma C
district sales manager; and RALPH W. N
CHOLS, Fort Worth district sales manag

Changes in the transmission division a
the exploration and gas supply division
Lone Star Gas Co. and Lone Star Produci
Co. include the following: JOHN M
KINDLE becomes superintendent of op
ations; THOMAS S. BACON will have e
panded duties as transmission division ch
engineer; CHESTER R. ROGERS has be
promoted to superintendent of gasol
plants; CARL M. HILL has become superi
tendent of operations under ALLEN BROW
who heads the exploration and gas supp
department; M. O. ATTEBERY is super
tendent of production.

The J. B. Beaird Co. Inc., Shreveport, h
promoted CHARLES T. BEAIRD to vice pre
dent, JOHN L. TULLIS to vice president a
general manager of sales, and MELVIN
JOHNSON to secretary.

ROBERT J. YOUNG has been appoint
assistant division manager of Hill, Hubb
& Co. He has been a member of the s
since 1937.

A. C. BOYER, formerly district engine
has been appointed assistant superintende
production and transmission of the Peop
Natural Gas Co., Pittsburgh. JOSEPH
PHILLIPS succeeds Mr. Boyer as a dist
engineer.

As part of its long-range program of pu
lic and community relations, Texas G
Transmission Corp., Owensboro, Ky., h
appointed JOHN R. KEATING manager
public relations and retained the firm
Bozell & Jacobs Inc. as public relati
counsel.